DRAFT

ENVIRONMENTAL ASSESSMENT

OF THE

FIELDING OF M2A2 BRADLEY FIGHTING VEHICLES AT CAMP FUNSTON/FORT RILEY, KANSAS, AND KANSAS ARMY NATIONAL GUARD ARMORIES

KANSAS ARMY NATIONAL GUARD

MAY 2004

ENVIRONMENTAL ASSESSMENT ORGANIZATION

This Environmental Assessment (EA) provides the description of the Proposed Action and alternatives, affected environment, and environmental consequences for the fielding of M2A2 Bradley Fighting Vehicles (BFVs) at Fort Riley, Kansas, and Kansas Army National Guard armories. The EA will facilitate the decision-making process regarding the Proposed Action and alternatives.

SECTION 1 **PURPOSE AND NEED FOR THE PROPOSED ACTION** summarizes the purpose of and need for the Proposed Action, provides relevant background information, and describes the scope of the EA.

SECTION 2 **DESCRIPTION OF THE PROPOSED ACTION** describes the Proposed Action.

SECTION 3 **ALTERNATIVES CONSIDERED** examines alternatives for implementing the Proposed Action.

SECTION 4 **AFFECTED ENVIRONMENT** describes the existing environmental and socioeconomic setting for each location considered.

SECTION 5 **ENVIRONMENTAL CONSEQUENCES** identifies potential environmental and socioeconomic effects of implementing the Proposed Action and alternatives and identifies potential mitigation measures.

SECTION 6 **COMPARISON OF ALTERNATIVES AND CONCLUSIONS** compares and contrasts the alternative effects, and summarizes the significance of individual and expected cumulative effects for each of the alternatives, and identifies potential mitigation measures.

SECTION 7 **REFERENCES** provides bibliographical information for cited sources.

SECTION 8 **LIST OF PREPARERS** identifies persons who prepared the document and their areas of expertise.

SECTION 9 **AGENCIES AND INDIVIDUALS CONSULTED** provides a listing of individuals and agencies consulted during preparation of the EA.

APPENDICES

A Agency Consultation Letters
B Federal or State-Listed Threatened or Endangered Species
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ENVIRONMENTAL ASSESSMENT OF THE FIELDING OF M2A2 BRADLEY FIGHTING VEHICLES AT CAMP FUNSTON/FORT RILEY, KANSAS AND KANSAS ARMY NATIONAL GUARD ARMORIES

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COVER SHEET

DRAFT ENVIRONMENTAL ASSESSMENT OF THE FIELDING OF M2A2 BRADLEY FIGHTING VEHICLES AT CAMP FUNSTON/FORT RILEY, KANSAS AND KANSAS ARMY NATIONAL GUARD ARMORIES

Lead Agency: Department of the Army, U.S. Army National Guard Bureau

Cooperating Agencies: None

Affected Jurisdictions: Fort Riley, Riley and Geary Counties; Kansas City, Wyandotte County; Lawrence, Douglas County; and Wichita, Sedgwick County, Kansas.

Title of Proposed Action: Fielding of M2A2 Bradley Fighting Vehicles (BFVs) at Camp Funston/Fort Riley, Kansas and Kansas Army National Guard armories.

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Document Designation: Draft Environmental Assessment (EA)

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Abstract: This document provides the description of the Proposed Action and alternatives, affected environment, and environmental consequences for the Fielding of M2A2 Operation Desert Storm Bradley Fighting Vehicles (BFVs) at Camp Funston/Fort Riley, Kansas and Kansas Army National Guard armories. The 2nd Battalion 137th Infantry, Kansas Army National Guard, proposes to field and operate 45 BFVs in various locations in Kansas, including two BFVs each at Wichita, Kansas City, and Lawrence, with the remainder (39) at Camp Funston/Fort Riley. The BFV would be issued as a replacement for the majority of the M113 Armored Personnel Carrier that is currently used by the

battalion. Activities that would occur under the Proposed Action would be limited to training with and maintenance of the new equipment. The Proposed Action would include changes to new military construction projects, and increases in personnel. The locations, frequency, duration, magnitude, and types of training and maintenance would not change under the Proposed Action. Consequently, potential environmental effects of the Proposed Action are largely associated with differences between the new and old equipment. Alternatives to the Proposed Action are also discussed, including the No Action Alternative.

DRAFT ENVIRONMENTAL ASSESSMENT OF THE FIELDING OF M2A2 BRADLEY FIGHTING VEHICLES AT CAMP FUNSTON/FORT RILEY, KANSAS AND KANSAS ARMY NATIONAL GUARD ARMORIES

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ABBREVIATIONS AND ACRONYMS

2-137 IN BN	2nd Battalion 137th Infantry
24 ID	24th Infantry Division
AHPA	Archaeological and Historic Preservation Act
AIRFA	American Indian Religious Freedom Act
AP	armor piercing
AQCR	Air Quality Control Region
ARPA	Archaeological Resources Protection Act
ARTEP	Army Training and Evaluation Program
AT	annual training
BFV	Bradley Fighting Vehicles
CA	Comprehensive Agreement
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
Co B	Bravo Company
CWA	Clean Water Act
DBH	diameter at breast height
DOD	Department of Defense
EA	Environmental Assessment
EDC	electrical distribution center
EIFS	Economic Impact Forecast System
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FA	Field Artillery
FNSI	Finding of No Significant Impact
FY	Fiscal Year
g/hp-hr	grams per horsepower-hour
g/hr	grams per hour
GIS	Geographic Information Systems
HE	high explosive
HEMTT	Heavy Expanded Mobility Tactical Trucks
HHB	Headquarters and Headquarters Battery
hp	horse power
ICRMP	Integrated Cultural Resources Management Plan
IDT	inactive duty training
INRMP	Integrated Natural Resources Management Plan
ITAM	Integrated Training Area Management
KDHE	Kansas Department of Health and Environment
KSARNG	Kansas Army National Guard
KSTC	Kansas Training Center
kVA	kilo volt-amperes
LF	linear feet
MATES	Mobilization and Training Equipment Site
M-COFT	Mobile Conduct of Fire Trainer
mg/m^3	milligrams per cubic meter
mm	millimeter
mpg	miles per gallon
mph	miles per hour

MRPC	Multi-Purpose Range Complex
MSA	Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Stansards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO2	nitrogen dioxide
NOx	nitrogen oxide
O_3	ozone
OMS	Organizational Maintenance Shop
PA	Programmatic Agreement
Pb	lead
$PM_{2.5, 10}$	particulate matter less than or equal to 2.5 or 10 microns
ppm	parts per million
psi	pounds per square inch
ROI	Region of Influence
SHPO	State Historic Preservation Officer
SINC	Species in Need of Conservation
SIP	State Implementation Plan
SO_2	sulfur dioxide
SPT BN	Support Battalion
TADSS	Training aids, devices, simulators and simulations
TCP	Traditional Cultural Properties
TOW	Tube-launched, optically tracked, wire guided subsystem
U.S.	United States
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
$\mu g/m^3$	micrograms per cubic meter

1. Purpose of and Need for the Proposed Action

1.1 Introduction

The Kansas Army National Guard (KSARNG) has 93 facilities throughout the state that serve as training sites, armories, equipment storage, and maintenance facilities supporting approximately 6,500 soldiers. Fifty-eight armories support 47 military units. KSARNG properties comprise a total of approximately 4,015 acres. The Kansas Training Center (KSTC), located west of Salina, is the largest single facility containing 3,536 acres. Approximately 55 percent of the KSARNG armories are located on one to two-acre sites and are fully developed areas.

The 2nd Battalion 137th Infantry (2-137 IN BN) is a component of the 218th Enhanced Separate Brigade (Mechanized) Infantry (South Carolina National Guard). These units comprise a "roundout" (*i.e.,* a National Guard unit that is necessary to complement active duty forces when activated) unit to the 24th Infantry Division (24 ID) (Mechanized), Fort Riley, Kansas. Fort Riley includes the Camp Funston Training Area, which is where KSARNG facilities are located and where equipment and trainers associated with this fielding will be housed.

This Environmental Assessment (EA) has been prepared in compliance with the National Environmental Policy Act of 1969 (NEPA), as implemented by the President's Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1500 *et. seq.*), and 32 CFR Part 651, *Environmental Analysis of Army Actions*. Its purpose is to inform decision makers and the public of likely environmental consequences of the Proposed Action and alternatives. If the analysis presented in the EA indicate that implementation of the Proposed Action would not result in significant environmental impacts, a Finding of No Significant Impact (FNSI) would be prepared. A FNSI briefly presents why a Proposed Action would not have a significant effect on the human environment and why an Environmental Impact Statement (EIS) is unnecessary. If significant environmental issues result that cannot be mitigated to insignificance, an EIS will be required, or the Proposed Action would be abandoned and no action would be taken.

1.2 Purpose and Need

In support of an Army directive in support of modernization of the force, the KSARNG proposes to replace its 56 M113 Armored Personnel Carriers with 45 M2A2 Bradley Fighting Vehicles (BFVs) at four locations in the State of Kansas (see Figure 1-1). Under the Proposed Action, 14 M113 would remain at Fort Riley/Camp Funston. The purpose of the Proposed Action is to replace the old, out of

date, M113 with a new and improved M2A2 BFV. The M113 is a 40 plus year old piece of equipment and needs to be replaced. Implementation of the Proposed Action would also ensure the 2-137 IN BN would acquire and maintain proficiency in use of the same modern ground combat systems used by the Army's Active Component.

The United States (U.S.) National Military Strategy requires employment of Reserve Component forces, including the KSARNG, to augment Active Component forces for operational missions. In the 1995 Annual Defense Report, the Secretary of Defense sent Congress a series of recommendations to improve accessibility to Reserve Component units and personnel (KSARNG 2003). The report recognized the need for early and extended Reserve Component participation in both major regional conflicts and peacetime operations. In support of this strategy, an ongoing goal of the Department of Defense (DOD) has been to provide Reserve Component units with modern, compatible equipment to enable them to do their job side by side with Active Component forces and coalition partners. In order to accomplish its military mission and maintain combat readiness, the KSARNG must conduct training with modern equipment that is compatible with the Active Army. The proposed force modernization addressed in this EA is required for the KSARNG to meet its mission requirements.

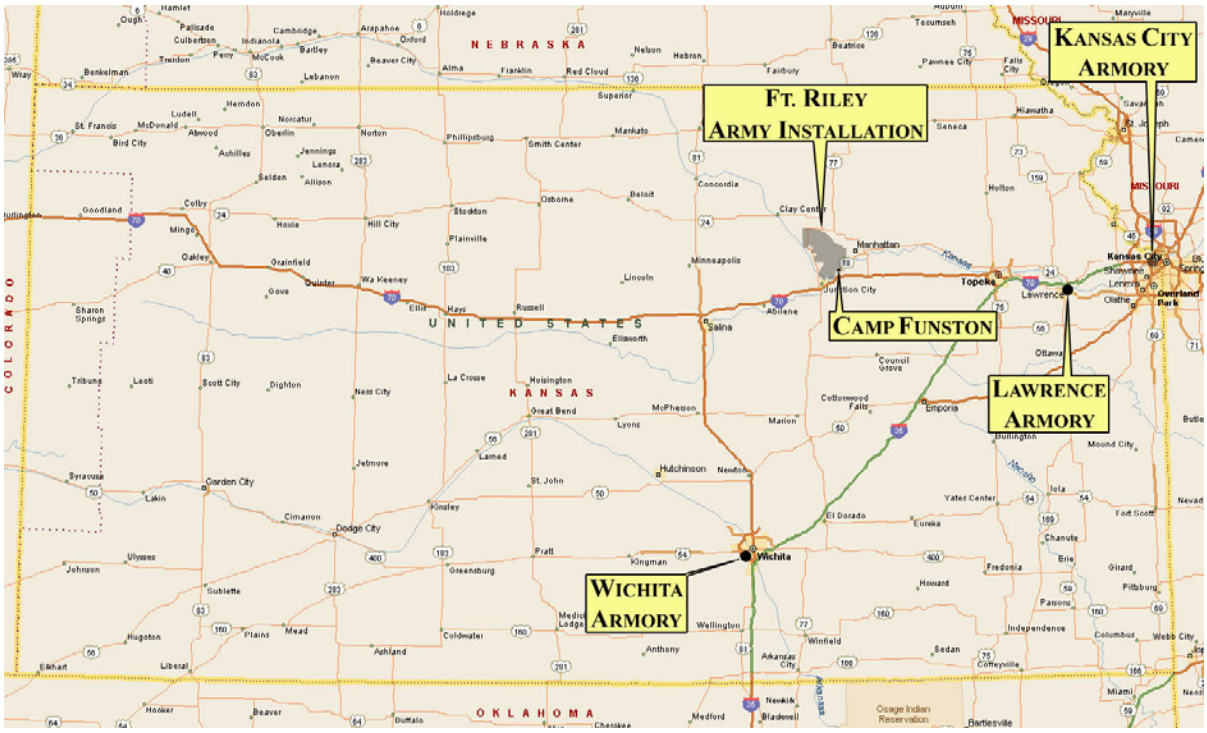


Figure 1-1. Proposed KSARNG M2A2 BFV Fielding Locations

1.3 Scope of the Document

The EA identifies, documents, and evaluates the effects of fielding M2A2 BFVs to the 2-137 IN BN in Kansas. An interdisciplinary team of environmental scientists, biologists, planners, economists, archaeologists, historians, and military technicians analyzed the Proposed Action and alternatives in light of existing conditions and identified potential beneficial and adverse effects associated with the Proposed Action. The KSARNG's Proposed Action and alternatives, including the No Action Alternative, are described in Sections 2.0 and 3.0. Conditions existing as of 2004, considered to be the baseline conditions, are described in Section 4.0. The expected effects of the Proposed Action are presented in Section 5.0. Section 5.0 also addresses the potential for cumulative effects, and mitigation measures are identified where appropriate.

A decision on whether to proceed with the Proposed Action will be based on numerous factors such as mission requirements, schedule, availability of funding, and environmental considerations. In addressing environmental considerations, KSARNG is guided by several relevant statutes (and their implementing regulations) and Executive Orders (EOs) that establish standards and provide guidance on environmental and natural resource management and planning procedures. These include, but are not limited to, the Clean Air Act (CAA), Clean Water Act (CWA), Noise Control Act, Endangered Species Act (ESA), National Historic Preservation Act (NHPA), Archaeological Resources Act, Resource Conservation and Recovery Act, Toxic Substances Control Act, EO 11988 (*Floodplain Management*), EO 11990 (*Protection of Wetlands*), EO 12088 (F*ederal Compliance with Pollution Control Standards*). EO 12898 (F*ederal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*), and EO 13045 (*Protection of Children from Environmental Health Risks and Safety Risks*). Where useful for better understanding, key provisions of these statutes and EOs are described in more detail in the text of the EA.

1.4 Agency and Public Participation

Agency and public participation in the NEPA process promotes open communication between the public and the government and enhances decision-making. All persons and organizations that have a potential interest in the Proposed Action, including minority, low-income, disadvantaged, and Native American groups, are urged to participate in the decision-making process. An information request letter was prepared and mailed to government agencies on March 3, 2004 to obtain information concerning the project area and to identify any potential issues. A list of agencies that received the letter is included in Section 9. A copy of the information request letter and responses are presented in Appendix A of the EA.

Public participation in preparing this EA is guided by 32 CFR Part 651, *Environmental Analysis of Army Actions*, issued in March 2002. Upon completion, the Draft EA will be made available for a 30-day comment period. The Final EA and Draft FNSI will be made available for a 30-day comment period, during which time KSARNG will consider any further comments submitted by agencies, organizations, or members of the public on the Proposed Action, Final EA, or FNSI. Upon conclusion of the final review period KSARNG will, if appropriate, execute the FNSI and implement the Proposed Action.

2. Description of the Proposed Action

The KSARNG proposes to field BFVs to the 2-137 IN BN to replace the 56 M113 Armored Personnel Carriers presently used by that organization. However, 14 M113 will remain at Fort Riley Camp Funston. There would be two BFVs each at 2-137 IN BN armory in Kansas City, Lawrence, and Wichita and 39 BFVs at Fort Riley. Activities with respect to the BFVs would generally be limited to training with, and maintenance of, the new equipment. The Proposed Action would include new military construction projects, and increases in personnel. The approximate construction cost for is $110,000 (e.g., Camp Funston $40,000, Lawrence Armory $35,000, and Wichita South Armory $35,000). The unit locations and types of training and maintenance with respect to the combat vehicles would not change under the Proposed Action. In addition to the fielding of the BFVs, there would be support teams for the BFVs stationed at Topeka and Junction City armories.

2.1 Characteristics of the M2A2 Bradley Fighting Vehicle

The BFV is a fully tracked, light armored vehicle. This vehicle can provide transport and firepower support if necessary. It possesses sufficient cross-country mobility to keep up with the M1A1 Abrams Main Battle Tank, medium and long-range firepower capable of defeating any vehicle on the battlefield, and is adequately armored to protect the crew from small caliber artillery and indirect fires. The M2 Infantry Fighting Vehicle was originally configured as the M2A0, and included the 500 horsepower (hp) engine; 25 millimeter (mm) cannon; the basic tube-launched, optically tracked, wire guided (TOW) subsystem; and integrated sight.

The M2A2 BFV is an upgraded version of the M2A0 with survivability enhancements. Changes include a 600 hp powertrain, 30 mm protection, spall liners, restowage of ammunition, TOW II subsystem, and other changes (KSARNG 2003). The M2A2 BFV carries a crew of three (Track Commander, Gunner, and Driver) and a seven-person Infantry squad. The M2A2 BFVs main armament is the M242 25 mm “Bushmaster” Chain Gun.

The M242 has a single-barrel with an integrated dual-feed mechanism and remote ammunition selection. Either armor piercing (AP) or high explosive (HE) ammunition may be selected by the Gunner for single or multiple shot modes. The standard rate of fire is 200 rounds per minute, with a range of 2,000 meters (depending on the ammunition used). The M240C machine gun mounted to right of the Bushmaster fires 7.62 mm rounds. When facing heavier enemy armor, the M2A2 BFV relies on the TOW missiles.

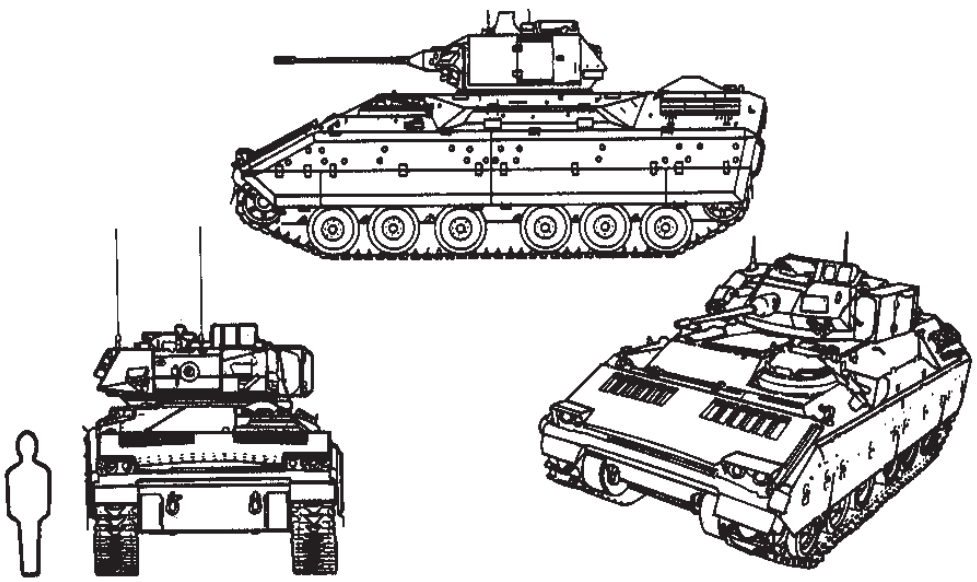
The range of the TOW missile is nearly four kilometers and will reach a speed of almost Mach 1 on its way to the target. The M2A2 BFV has the TOW II subsystem. The hull of the M2A2 BFV is constructed of welded aluminum and supplemented at critical locations by spaced laminate armor. The M2A2 BFV has additional appliqué steel armor to help defeat ballistic ammunition, with provision for explosive reactive armor for increased protection against shaped charge weapons. All BFVs are amphibious by way of a water barrier, which is erected by the crew before entering the water. Water propulsion is provided by tracks that propel the vehicle at about four miles per hour.

Table 2-1 presents a comparison of the M113 Armored Personnel Carrier and the M2A2 BFV and Figure 2-1 shows schematics of both vehicles.

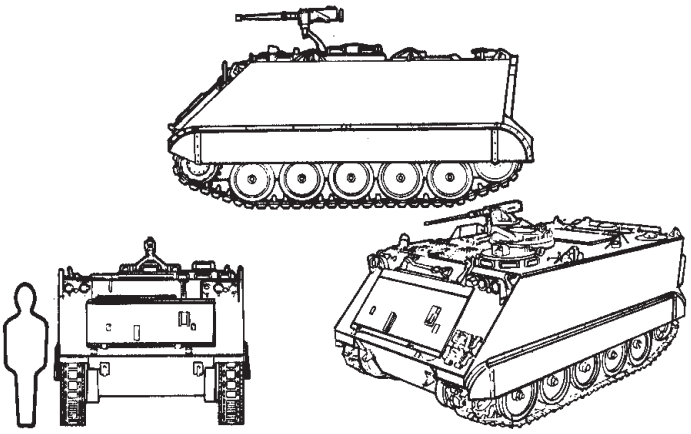
Table 2-1. Technical Comparison of the M113 Armored Personnel Carrier and the M2A2 BFV

Characteristics	M113	M2A2 BFV
Weight, combat loaded (pounds)	27,200	66,000
Track width (inches)	21	21
Ground Pressure (pounds per square inch [psi])	8.67	9.85
Power Plant	275 hp turbo-diesel	600 hp turbo-diesel
Transmission	Cross drive	Hydromechanical
Fuel Tank (gallons)	95	175
Cruising range (miles)	300	250
Fuel Consumption (miles per gallon [mpg])	3.16	1.43
Engine crankcase (gallons)	6.0	5.0
Transmission (gallons)	9.0	14
Maximum forward speed (miles per hour [mph])	40	38
Maximum swim speed (mph)	3.6	4
Primary weapon	.50 Caliber	25 mm, M242 Bushmaster
Secondary weapons	-----	7.62 mm, M240C MG; and TOW II
Crew Capacity	2 crew and 11 infantry	3 crew and 7 infantry

Source: Global Security 2004



M2A2 BRADLEY FIGHTING VEHICLE



M113 ARMORED PERSONNEL CARRIER

Figure 2-1. The M2A2 BFV and the M113 Armored Personnel Carrier

2.2 Proposed Siting Locations

The KSARNG proposes to field M2A2 BFVs to four locations: Fort Riley and the KSARNG armories in Kansas City, Lawrence, and Wichita.

Fort Riley/Camp Funston. Fort Riley is a permanent U.S. Army installation with the primary mission to provide training, facilities, housing, and support to the 24 ID (Mechanized), located in northeastern portion of the State of Kansas in Riley and Geary Counties, approximately 60 miles west of Topeka (Figure 2-2). Fort Riley became a War Fighting Center in 2002 to assist in implementing a U.S. Department of Army transformation initiative to more fully integrate Army Reserve and National Guard units into active Army missions. A wide range of activities occur on a daily basis at Fort Riley to conduct and support the installation's assigned training mission. Typical training operations at Fort Riley include field maneuvers, combat vehicle operations, mortar and artillery fire, and small arms fire. Camp Funston is a part of Fort Riley, which is the home of KSARNG facilities. The Mobile Conduct of Fire Trainer (M-COFT) construction location would occur in Camp Funston, which is discussed further in Section 2.4.

Kansas City Armory. Kansas City Armory was constructed in 1956 and its primary mission is to provide training, facilities, housing, and support multiple KSARNG units. Kansas City Armory is located in northwest Kansas City, Wyandotte County (Figure 2-3).

Lawrence Armory. Lawrence Armory was constructed in 1961 and its primary mission is to provide training, facilities, housing, and support multiple KSARNG units. Lawrence Armory is located in north-central Lawrence, Douglas County (Figure 2-4).

Wichita South Armory. Wichita South Armory was constructed in 1958 and its primary mission is to provide training, facilities, housing, and support multiple KSARNG units. Wichita South Armory is located in south central Wichita, Sedgwick County (Figure 2-5).

2.3 Training Activities

This section presents additional details on training activities that would occur with the new equipment at the training areas covered by this EA. As discussed below, training with the proposed equipment would be the same as or similar to current training. Under the Proposed Action, the unit locations and types of training and maintenance with respect to the combat vehicles would not change, however there would be a slight increase in the number of pieces of equipment stationed at Camp Funston.

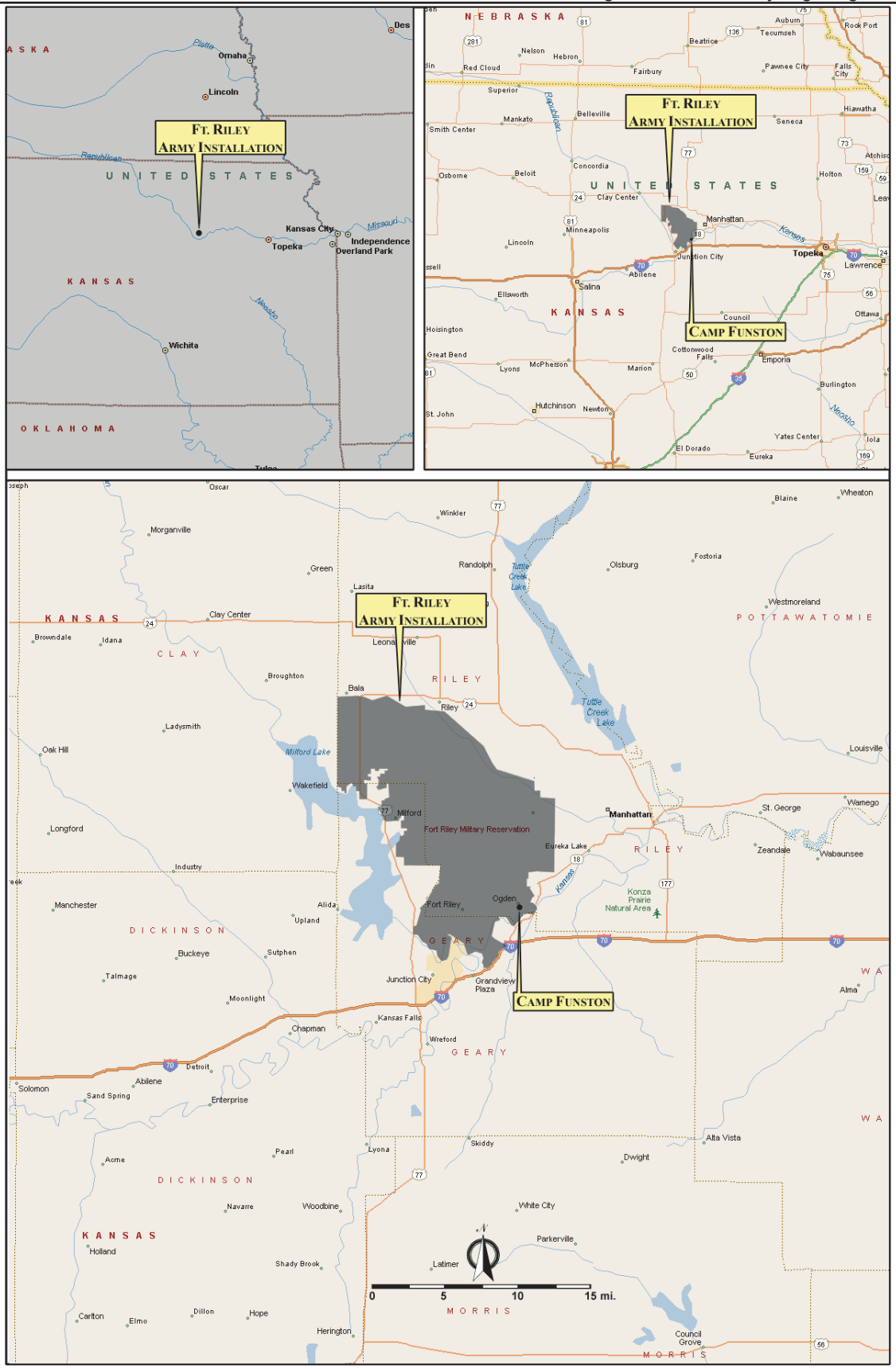


Figure 2-2. Fort Riley Vicinity Map

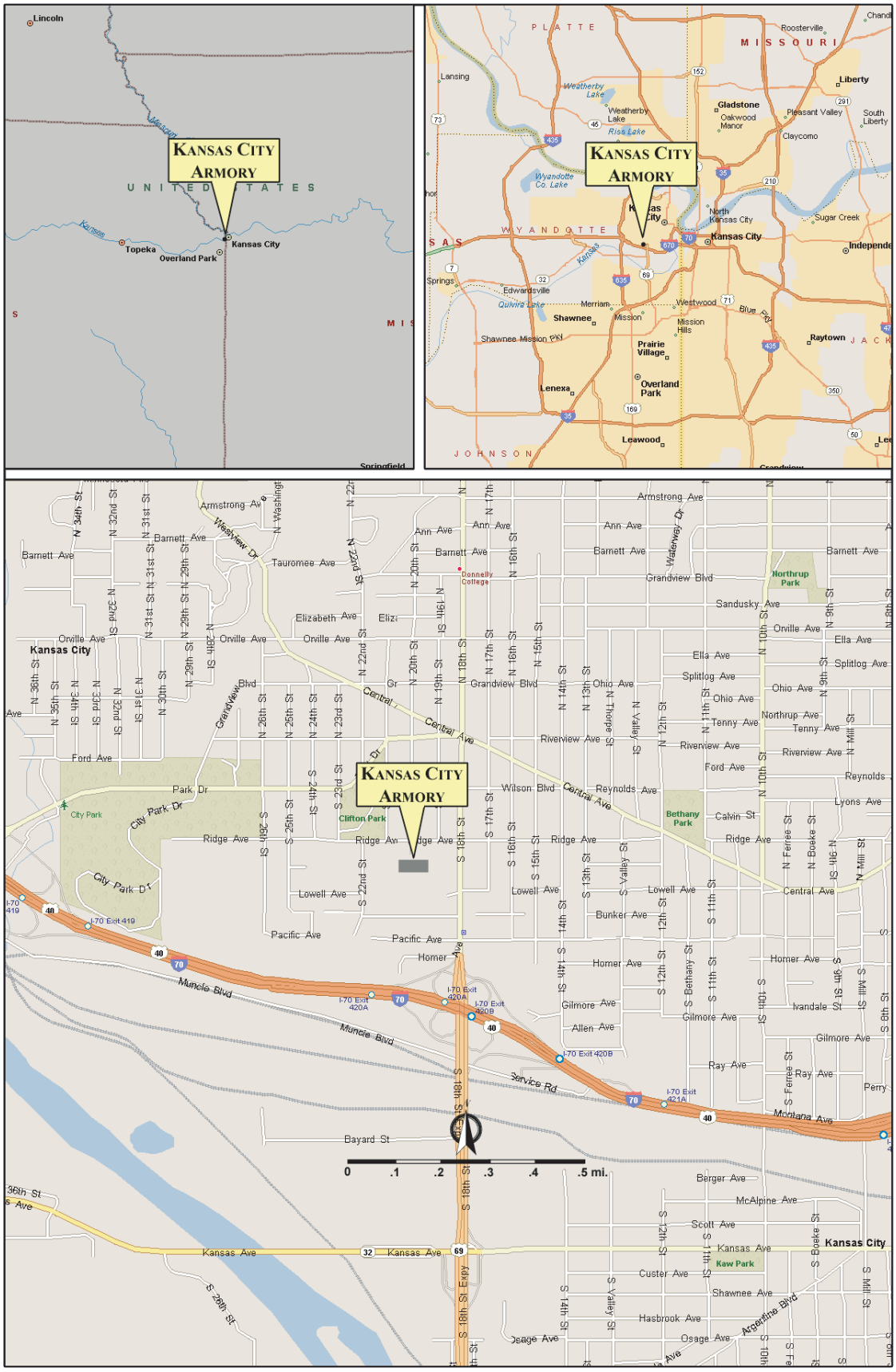


Figure 2-3. Kansas City Vicinity Map

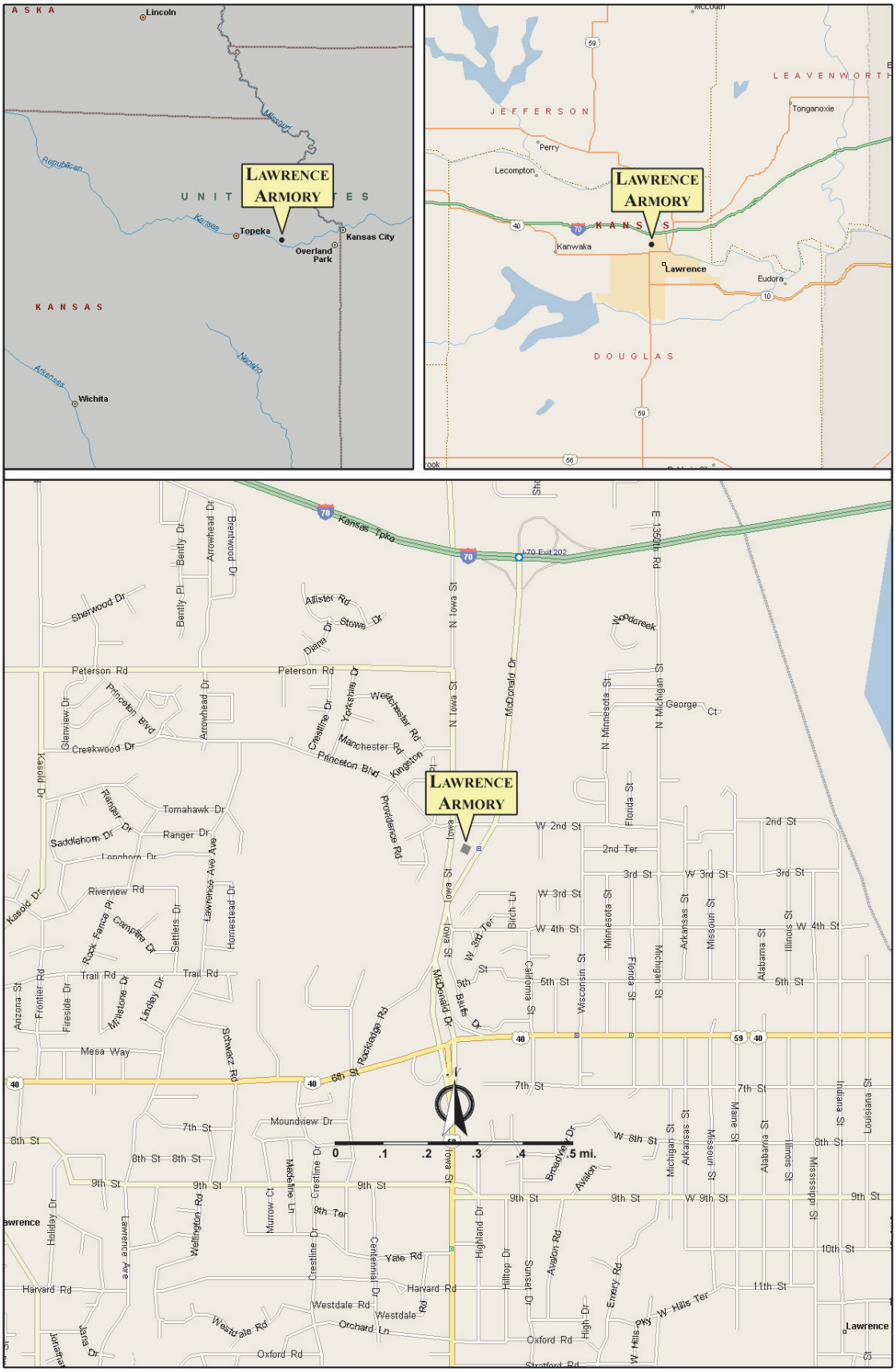


Figure 2-4. Lawrence Armory Vicinity Map

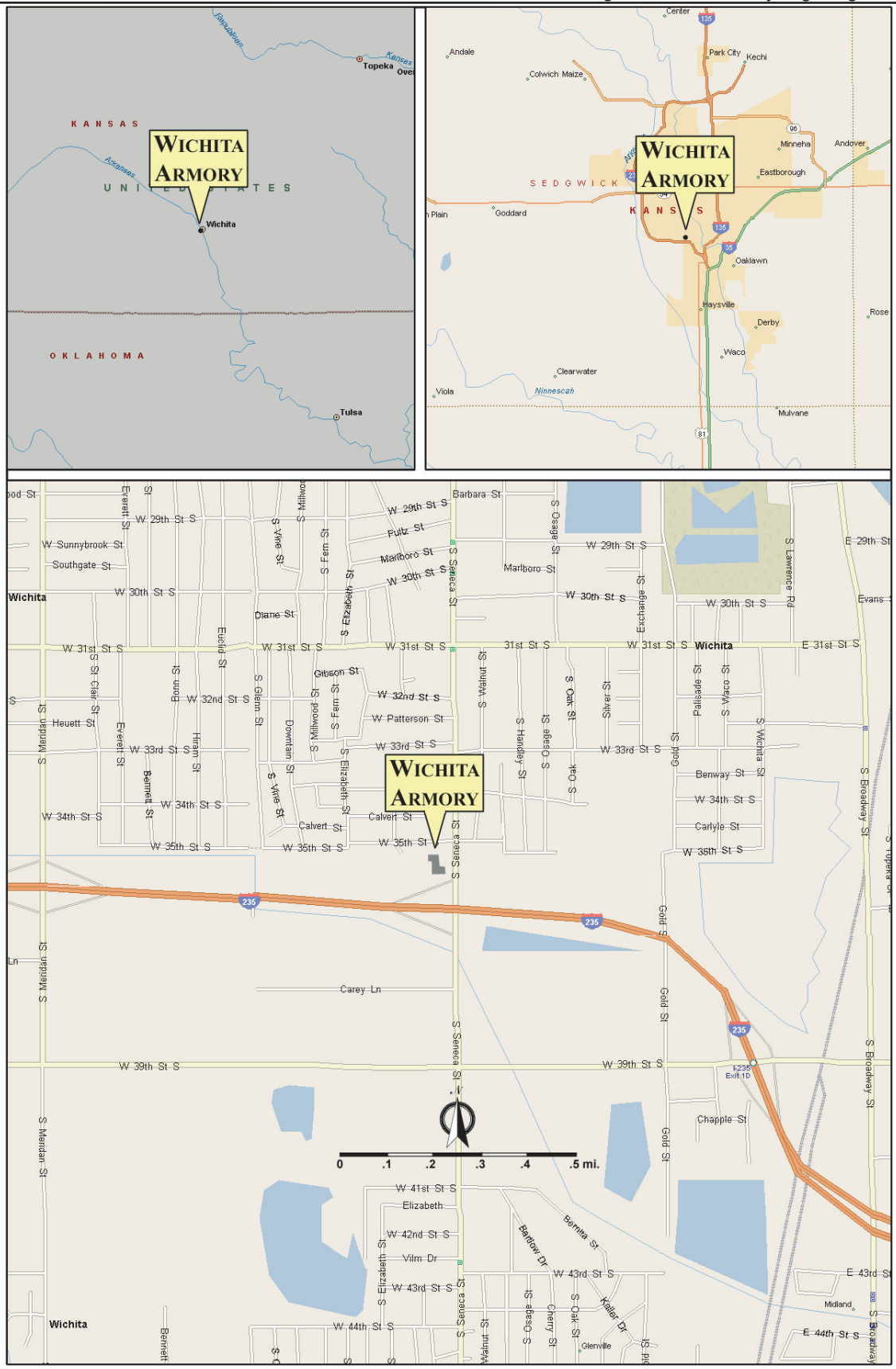


Figure 2-5. Wichita South Armory Vicinity Map

Training for modern combat must replicate, as closely as practicable in a peacetime environment, conditions that might be encountered on a battlefield. The foundation and key principal in the Army's training doctrine is that units must train in peacetime as they will fight during war. Peacetime training replicates battlefield conditions (KSARNG 2003).

Training activities for Army units (both Active and Reserve) are goal oriented and are based on numerous tasks, conditions, and standards outlined in various Army Training and Evaluation Programs (ARTEPs). The descriptions of training activities presented in this document provide the detail necessary to evaluate potential impacts on the environment. These descriptions are not intended to address the complexities of military operations during training or on the battlefield.

Under the Proposed Action, units of the KSARNG would train with the proposed equipment during both annual training (AT) and inactive duty training (IDT). AT generally takes place during summer months for a 14-day period and includes a larger military training force (i.e., full battalion) and IDT takes place one weekend per month and usually includes a single unit or two. AT and IDT differ in the manner in which they are executed, the emphasis on particular skills, and the level of training or size of the unit participating. Specific distinctions are not made between AT and IDT for evaluating impacts in this EA.

Training activities that would occur under the Proposed Action are broadly categorized as follows:

- Gunnery exercises
- Maneuver exercises
- Maintenance activities

General descriptions of these activities are provided below, followed by equipment specific information for each training location.

2.3.1 Gunnery Exercises

Gunnery exercises with the M2A2 BFV would involve training with the various weapons systems during both AT and IDT. These training exercises include the use of training aids, devices, simulators, and simulations (TADSS), as well as live-fire exercises. Use of TADSS may occur at the home station (*i.e.*, armories) or major training areas.

Live-fire exercises are limited to tank gunnery ranges at major training areas, which are specifically designed to accommodate such training. Live-fire exercises would be conducted during the day and

at night using stationary, moving, and popup targets at various distances. These exercises would be conducted from stationary firing points and while the equipment is maneuvering on the range. As in the past, units conducting training operations on gunnery ranges would normally bivouac near the ranges that are being used. These live exercises would primarily occur at Fort Riley, but may also take place at other installations outside the State of Kansas with suitable gunnery ranges. The M2A2 BFVs are fired from Multi-Purpose Training Range (Range 18) and Multi-Purpose Range Complex (Douthit Range) gunnery (MPRC). Figure 2-6 shows location of these two ranges.

Multi-Purpose Training Range (Range 18). Battalions use approximately 28 square miles (70 square kilometers) of training area during MPTR gunnery exercise training at Range 18 (including the ammunition impact area and training areas 6 through 9). Range 18 gunnery exercises are live-fire training events.

Multi-Purpose Range Complex (Douthit Range) gunnery. The MPRC range is a 6,900-acre "box" that is off-limits to maneuver. The range is located in the northwest section of Fort Riley, southwest of the town of Riley, and northeast of the town of Milford. BFVs travel on existing roads and fire at moving, pop-up targets. Other weapons fired include the attack helicopter, TOW missiles, and small arms. MPRC gunnery exercises are live-fire training events. All munitions fired on the MPRC are inert (non-explosive).

MPRC Safety Fan encompasses an area of approximately 30,500 acres extending southeast from the MPRC. This area incorporates the farthest possible range of any weapon used at the MPRC. The amount of proposed yearly BFV ammo usage at Fort Riley for 25 mm, 7.62 mm, and TOW missile weapon systems is 12,686, 76,480, and 14 (inert) rounds, respectively.

2.3.2 Maneuver Exercises

Maneuvering includes the movement and positioning of combat vehicles during training exercises without firing weapons. Maneuver training with the new vehicles would be the same or similar to current maneuver training with existing vehicles. Figure 2-6 depicts the primary proposed maneuver training areas utilized by the M2A2 BFV. M2A2 BFV maneuver training would consist of driver training, simulated battlefield drills and formations, reconnaissance exercises, and the establishment of defense positions. This training would occur on established tank trails and within designated maneuver training areas, as specified in the Range Regulations for the individual training sites. Equipment recovery vehicles, fuel tankers (Heavy Expanded Mobility Tactical Trucks [HEMTT]), and a number of other support vehicles would be used during these exercises.

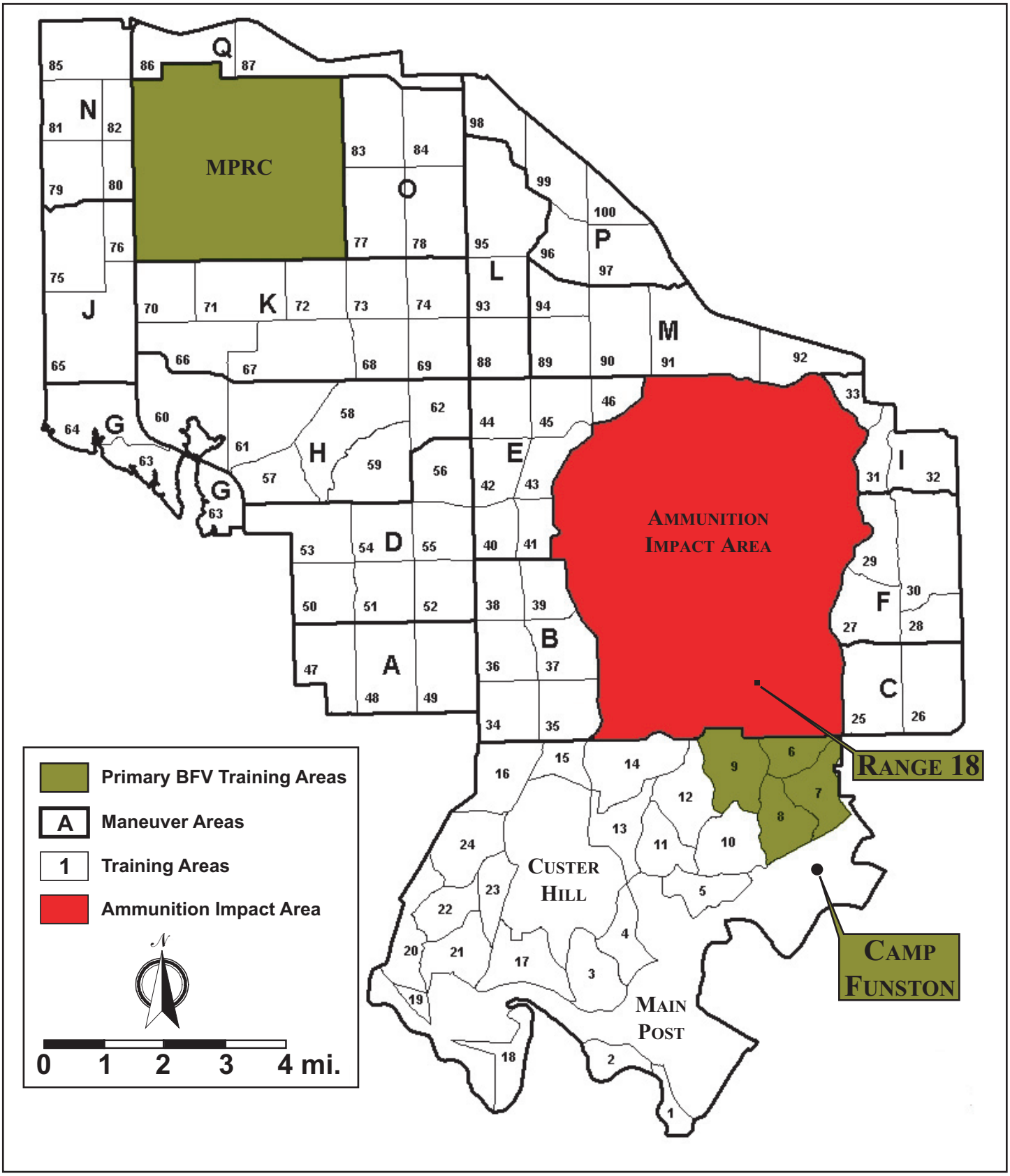


Figure 2-6. Maneuver Training Areas on Fort Riley

2.3.3 Maintenance Activities

Maintenance requirements for the new vehicles would be similar to that of the existing vehicles. Maintenance would be conducted at Mobilization and Training Equipment Sites (MATES) located at Fort Riley. The MATES facility would be responsible for signing for, issuing, warehousing, inventorying, and repairing the combat vehicles, which would involve fluid changes, part exchanges and calibrations.

Maintenance generally involves the use of petroleum, oil, and lubricant products, hydraulic fluid, and part cleaning solvents, some of which are categorized as hazardous waste. Maintenance of the M2A2 BFV would not result in creation or introduction of any different or greater quantity of materials or wastes than that of the existing equipment. Storage, handling, and disposal of maintenance-related waste materials would continue to be managed in accordance with federal and state regulations, as well as location-specific management plans.

Vehicle washing would continue to be conducted at designated wash facilities after completion of training exercises. Emergency field maintenance would be performed as required on gunnery ranges and in maneuver areas. Organizational Maintenance Shops (OMS) are located at the Kansas City Armory and in Wichita. The Kansas City Armory would conduct maintenance support for the Lawrence Armory. These OMS would conduct general routine maintenance and minor services such as engine and transmission fluid changes and parts replacement.

2.4 Proposed Construction Program

KSARNG has identified the need to provide an M-COFT at Camp Funston and the Lawrence and Wichita South armories to support the proposed fielding of the BFV. The M-COFT is a shelter mounted trainer/simulator for Company-sized elements that replicate the interior of an M2-series vehicle (see Figure 2-7). The simulator would provide training in target acquisition, and identification and engagement with weapon systems of assigned equipment. The high cost of training and ammunition, lack of available range facilities and associated cost of moving vehicles, equipment, and soldiers to existing range facilities results in an annual peak in crew proficiency followed by an extended period of non-firing and subsequent decrease in proficiency. This M-COFT would provide initial and subsequent gunnery sustainment training and significantly improve crew proficiency in all aspects of gunnery for BFVs.

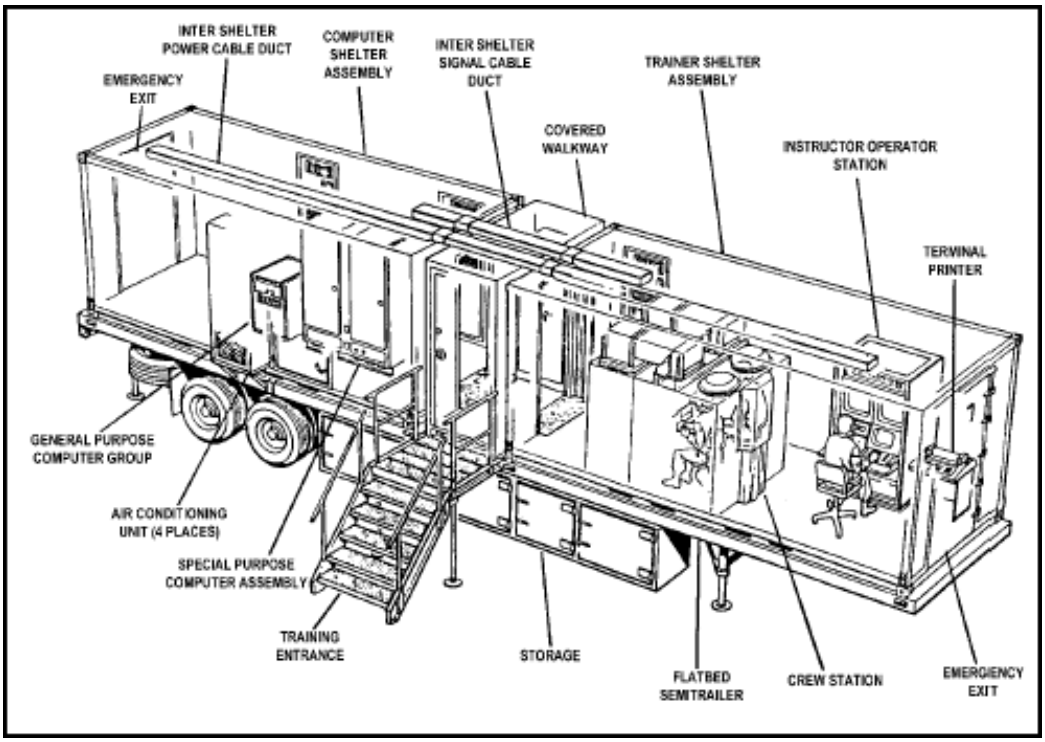


Figure 2-7. Diagram of a Mobile Conduct of Fire Trainer

The M-COFT requires commercial 3 phase power, 480 volt, delta service originating at a service pole by the local utility company. Three 37.5 kilovolt-amperes (kVA) pole mounted transfers would feed the service entrance. Telephone service (12 pair minimum) would be from phone service point of connection to designated point near the electrical distribution center (EDC). The M-COFT would be enclosed by 160 linear feet (LF) of chain link fence with two 20-foot wide double swing gates. A pole mounted security light would be installed in the vicinity of the EDC and the light would be fed with wire and conduit, sized for load, from the EDC.

Figure 2-8, 2-9, and 2-10 show the proposed location sites of the M-COFT at Camp Funston, Lawrence Armory, and Wichita South Armory, respectively. The M-COFT at Camp Funston would be located in the southeast portion of Fort Riley; the northeast side of the Lawrence Armory; and the northwest side of the Wichita South Armory.

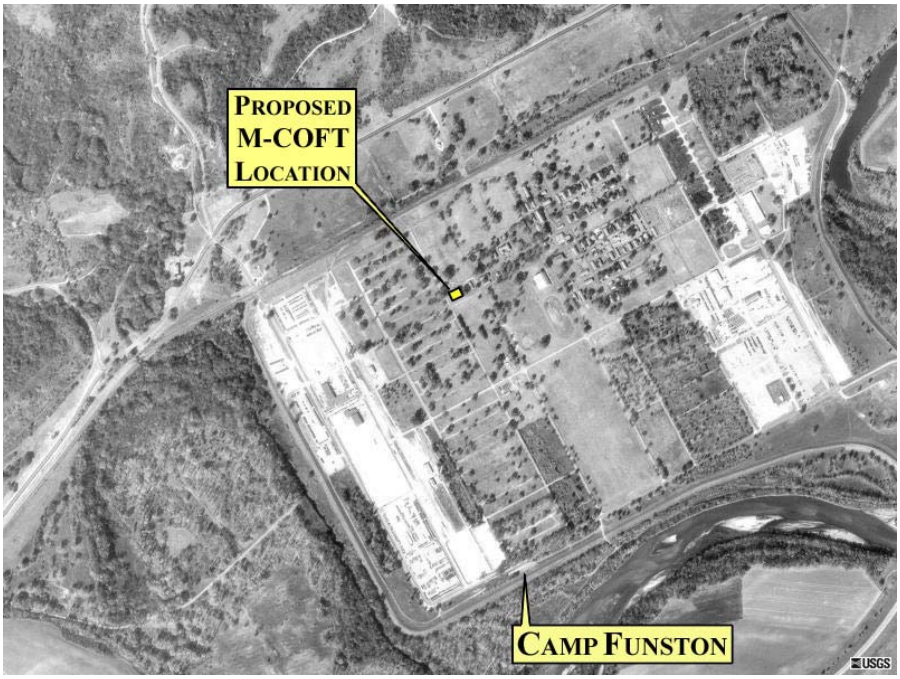


Figure 2-8. Camp Funston Site Map

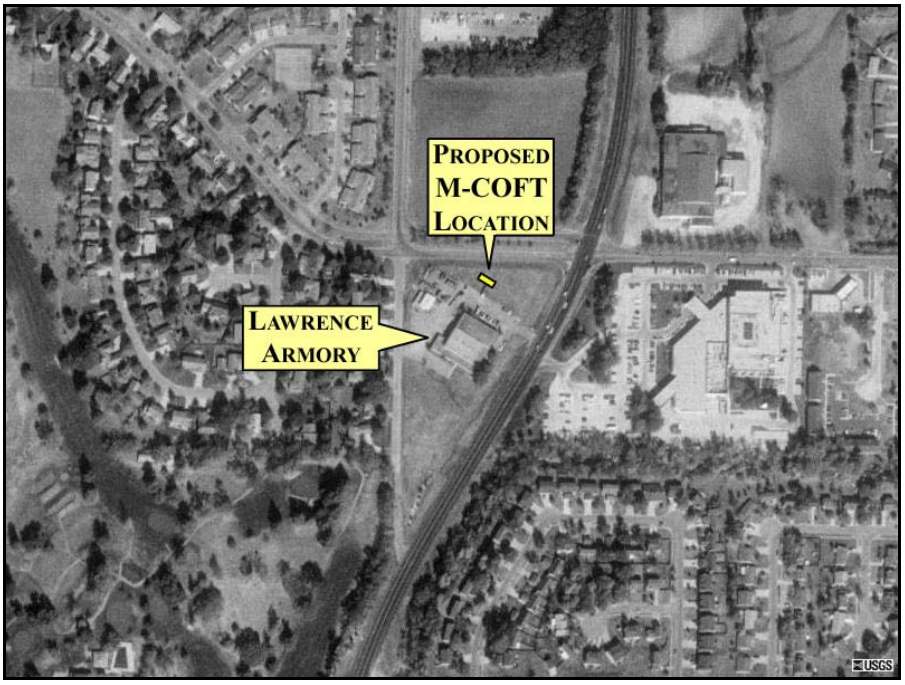


Figure 2-9. Lawrence Armory Site Map

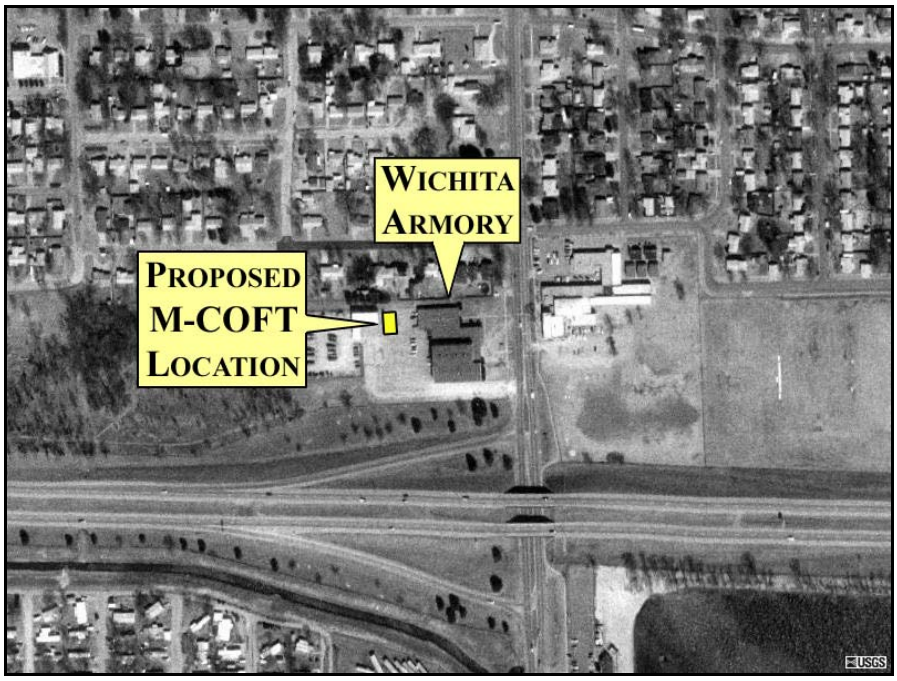


Figure 2-10. Wichita South Armory Site Map

2.5 Proposed Personnel Changes

The Topeka Armory is in south-central Topeka, in Shawnee County. Topeka would receive 16 soldiers from Detachment Unit 2, Headquarters and Headquarters Battery (HHB), 1-178th Field Artillery (FA), a fire support team. These 16 soldiers would co-exist within the same space as a similar unit that is already stationed at Topeka. Topeka Armory would have a total population of 1,226, which would include the 16 soldiers, in Fiscal Year (FY) 2004.

The Junction City Armory is in Junction City, in Geary County. Junction City would receive 35 soldiers from Detachment 1, Bravo Company (Co B), 163rd Support Battalion (SPT BN), a maintenance team for the BFVs. Junction City Armory would have a total population size of 136, which would include the 35 soldiers, in FY 2004 (SAMAS 2003).

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3. Alternatives Considered

3.1 Alternatives Development

The Proposed Action presented in Section 2 is the ARNG's preferred alternative. Fielding and operation of the M2A2 BFV is required for the ARNG to meet its mission requirements and to support the U.S. National Military Strategy. Therefore, reasonable alternatives to the Proposed Action are limited to consideration of alternative fielding locations. Criteria for selection of fielding locations include:

- Suitability of site for conducting training in accordance with tasks, conditions and standards outlined in Army Training and Evaluation Programs
- Current use of training site
- Environmental factors
- Proximity of training site to units

3.2 Alternatives to the Proposed Action

Evaluation and selection of fielding locations includes an analysis of whether to field new equipment at locations other than those proposed to be used by KSARNG for M2A2 BFV training. Consideration of alternative training sites must be limited to existing training areas that have suitable facilities to conduct required training and maintenance. The time required to establish new training sites would also adversely impact the KSARNG's ability to meet its force modernization requirements in a timely manner. Use of existing training sites other than those included in the Proposed Action could also adversely impact mission readiness by increasing travel time for soldiers and complicating logistics. The training site locations included in the Proposed Action are currently used for M113 Armored Personnel Carrier training by KSARNG units, based on suitability and proximity to local units. Proximity is an important factor since KSARNG units are allotted approximately 39 days per year for training (one weekend each month and one two-week period per year). This limited training time includes traveling to and from the training site. If units are required to travel long distances, valuable training time is lost and readiness could be compromised. For these reasons, consideration of fielding locations other than those presently used is not feasible. This alternative does not fully support the KSARNG's mission and is not viable in supporting the stated purpose of and need for this Proposed Action. Therefore, this alternative is not carried forward for further analysis in this EA.

3.3 No Action Alternative

Under the No Action Alternative, units from the KSARNG would not field or operate the M2A2 BFV. The units would continue to operate under the "status quo" with existing equipment at the training sites. The No Action Alternative would not meet KSARNG requirements for force modernization and compatibility with Active Army forces and would seriously affect the 2-137 IN BN ability to complete war fighting requirements both in peacetime (training) and in wartime. Consequently, the ability to maintain military readiness would be seriously compromised under the No Action Alternative. The existing conditions of the surrounding environment would not change under the No Action Alternative. These baseline conditions are described in Section 4 of this EA and serve as a benchmark for evaluation of potential impacts of the Proposed Action. CEQ and Army regulations for implementing NEPA require consideration of the No Action Alternative.

4. Affected Environment

This section describes the current environmental conditions of the areas that would be affected by implementing the proposed action. Only those environmental resources and resource parameters that could potentially be affected by the action, or are of public concern, are included in this section and are analyzed under the Environmental Consequences (Section 5). As set forth in Section 1.3, per 40 CFR 1501.7(a) (3), this EA addresses a focused scope of potentially impacted environmental and socioeconomic resources: air quality, geological resources, biological resources, cultural resources, and socioeconomics and environmental justice.

All environmental documentation (*i.e.*, Fort Riley U.S. Army Installation and 24th Infantry Division (Mechanized) Integrated Natural Resource Management Plan [INRMP], Fort Riley U.S. Army Installation and 24th Infantry Division (Mechanized) Integrated Cultural Resources Management Plan [ICRMP]) used to eliminate the following resource areas have been provided by the KSARNG, a tenant organization at Fort Riley and KSARNG armories.

4.1 Resources Not Examined in Detail

This is a "focused EA," consistent with guidance issued by CEQ in 40 CFR 1501.7(a)(3) and Department of the Army guidance set forth in 32 CFR 651.34. The description of the affected environment focuses on those conditions and resource areas that are potentially subject to impacts. Some environmental resource areas and conditions that are often analyzed in an EA have been omitted from this analysis. The following sections detail omitted resource areas and the basis for such exclusion: land use, water resources, noise, and hazardous materials and waste.

Land use, water resources, noise, and hazardous materials and waste in the vicinity of the proposed fielding areas would not change because the vehicles proposed for fielding have the same armaments and use the same ammunition as the M2A2s currently fielded at Fort Riley. Active duty units currently train in the M2A2 at Fort Riley. Vehicle maneuvers and training in the M2A2 are not new activities proposed at Fort Riley. These activities have been addressed in the various plans, such as the INRMP and ICRMP for Fort Riley. Therefore, descriptions of existing conditions and impacts for land use, water resources, noise, and hazardous materials and waste are not included in the EA. The level of detail applied to each particular resource area is commensurate with the level of importance and concern for that resource and the issues that it presents.

4.1.1 Land Use

Fielding of BFVs to replace M113s would neither change nor affect land use classifications. The locations where the combat vehicles would be used would still be classified, for instance, as "training areas" at Fort Riley and "industrial" or "maintenance" at the armories proposed to receive the BFVs.

4.1.2 Water Resources

Fielding of BFVs to replace M113s would not affect surface or water resources. The installations where the BFVs would be fielded would not increase or decrease their reliance on use of surface or groundwater resources as a result of implementation of the Proposed Action. Operation of the BFVs would be similar to that of M113s, with the vast predominance of maneuver occurring on upland areas capable of supporting the vehicles' travel and stream crossings occurring at bridged or hardened locations. Construction related to the Proposed Action would not affect surface waters, as it would occur within well-defined, already-improved areas.

4.1.3 Noise

Fielding of BFVs to replace M113s would not produce noticeable changes in the noise environment. Maintenance of vehicles typically occurs while engines are turned off or idling. Vehicles operations involving maneuver generally occur at training ranges and maneuver areas that are, by their nature, remote from receptors that might be sensitive to noise.

4.1.4 Hazard Materials and Waste

Fielding of BFVs to replace M113s would not affect existing conditions with respect to hazardous materials and wastes. Fort Riley and KSARNG armories would comply with AR 200-1, *Environmental Protection and Enhancement*, for all requirements concerning hazardous materials and wastes, as well as all other federal, state, and local laws and regulations. The M2A2 BFV maintenance would typically be conducted within OMS to reduce the potential for spills to reach the outside environment. All activities involving the handling and use of petroleum, oil, and lubricants would be conducted in accordance with established Spill Prevention Control and Countermeasure and hazardous material and waste management plans. Used oil, antifreeze, paint waste, waste fuels, spent batteries, and spent cleaning compounds and solvent would be temporarily stored in designated waste storage buildings or satellite waste accumulation areas before being recycled or disposed of by contract vendors.

The proposed fielding of 45 M2A2 BFVs and associated mission exercises at Fort Riley and KSARNG armories, would involve procurement of products containing hazardous materials on a scale comparable to other mission exercises on the base. The volume, type, classifications, and sources of hazardous waste associated with the Proposed Action would be similar in nature to the current condition of waste streams. Fort Riley and KSARNG armories have programs in place to dispose of hazardous wastes. The amounts of hazardous materials and wastes associated with BFVs are comparable to other M113s operating at the fielding locations. Personnel ensure all recyclable materials are recycled. Hazardous materials and waste management at Fort Riley and KSARNG armories would not be impacted by the proposed mission exercises. In light of these considerations, hazardous materials and waste management is not discussed further in this EA.

4.2 Air Quality

4.2.1 Definition of Resource

Air quality in a given location is determined by the concentration of various pollutants in the atmosphere. National Ambient Air Quality Standards (NAAQS) are established by U.S. Environmental Protection Agency (USEPA) for criteria pollutants, which include ozone (O_3) precursors (nitrogen oxide compounds [NO_x] and volatile organic compounds [VOCs]), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter equal to or less than ten microns in diameter (PM_{10}), and lead (Pb). NAAQS represent maximum levels of background pollution that are considered safe, with an adequate margin of safety to protect public health and welfare.

The Clean Air Act Amendments of 1990 place most of the responsibility to achieve compliance with NAAQS on individual states. To this end, USEPA requires each state to prepare a State Implementation Plan (SIP). A SIP is a compilation of goals, strategies, schedules, and enforcement actions that would lead the state into compliance with all NAAQS; changes to the compliance schedule or plan must be incorporated into the SIP. Areas not in compliance with a standard can be declared nonattainment areas by USEPA or the appropriate state or local agency. In order to reach attainment, NAAQS may not be exceeded more than once per year. State rules and regulations must be equivalent to, or more stringent than, the federal program. Table 4-1 presents the primary and secondary NAAQS that apply to the air quality in Kansas.

In 1997, USEPA initiated work on new General Conformity rules and guidance to reflect the new 8-hour O_3, $PM_{2.5}$, and regional haze standards that were promulgated in that year. However, because of

the litigation and resulting delay in implementing the new O_3 and $PM_{2.5}$ ambient air quality standards, these new conformity requirements have not been completed by USEPA, and no draft rule language is currently available. Each region is classified as an attainment area or nonattainment area for each of the criteria pollutants depending on whether it meets or fails to meet the NAAQS for the pollutant. All of the proposed locations are located in attainment areas. Therefore, a General Conformity Rule applicability analysis is not required for these installations.

Table 4-1. National Ambient Air Quality Standards

Pollutant	Standard Value		Standard Type
Carbon Monoxide (CO)			
8-hour Average	9 ppm	(10 mg/m^3) [2]	Primary & Secondary
1-hour Average	35 ppm	(40 mg/m^3) [2]	Primary
Nitrogen Dioxide (NO_2)			
Annual Arithmetic Mean	0.053 ppm	(100 $\mu g/m^3$) [2]	Primary & Secondary
Ozone (O_3)			
1-hour Average[1]	0.12 ppm	(235 $\mu g/m^3$) [2]	Primary & Secondary
8-hour Average[1]	0.08 ppm	(157 $\mu g/m^3$) [2]	Primary & Secondary
Lead (Pb)			
Quarterly Average		1.5 $\mu g/m^3$	Primary & Secondary
Particulate < 10 micrometers (PM_{10})			
Annual Arithmetic Mean		50 $\mu g/m^3$	Primary & Secondary
24-hour Average		150 $\mu g/m^3$	Primary & Secondary
Particulate < 2.5 micrometers ($PM_{2.5}$)			
Annual Arithmetic Mean		15 $\mu g/m^3$	Primary & Secondary
24-hour Average		65 $\mu g/m^3$	Primary & Secondary
Sulfur Dioxide (SO_2)			
Annual Arithmetic Mean	0.03 ppm	(80 $\mu g/m^3$) [2]	Primary
24-hour Average	0.14 ppm	(365 $\mu g/m^3$) [2]	Primary

Notes:

[1] In July 1997, the 8-hour O_3 standard was promulgated and the 1-hour O_3 standard was remanded for all areas, except those designated nonattainment with the 1-hour standard when the O_3 8-hour standard was adopted. In July 2000, the O_3 1-hour standard was reinstated as a result of the federal lawsuits that were preventing the implementation of the new 8-hour O_3 standard. USEPA estimates that the revised 8-hour O_3 standard rules will be promulgated in 2003-2004. In the interim, no areas can be deemed definitively nonattainment with the new 8-hour standard.

[2] Parenthetical value is an approximately equivalent concentration.

ppm – parts per million

mg/m^3 – milligrams per cubic meter

$\mu g/m^3$ – micrograms per cubic meter

4.2.2 Existing Conditions

Regional Air Quality. Under the authority of the CAA and subsequent regulations, USEPA has divided the country into geographical regions known as Air Quality Control Regions (AQCRs) to evaluate compliance with the NAAQS. Through the CAA, Congress has stated that the prevention and control of air pollution belongs at the state and local level, thus USEPA has delegated enforcement of the prevention of significant deterioration and Title V programs to the Kansas Department of Health and Environment (KDHE). The KDHE has adopted the NAAQS by reference, thereby requiring the use of the standards within the State of Kansas. The State of Kansas is under the jurisdiction of USEPA Region VII and the KDHE. The KDHE implemented the Title V Operating Permit program through Article 28-19-500. The State of Kansas is divided into six AQCRs.

Air quality is typically good throughout the State of Kansas, and is generally affected only locally by military and civilian vehicle emission, particulate pollution from vehicle traffic, fumes from wastewater treatment plants, and construction activities.

Air quality is affected by stationary sources (*e.g.*, urban and industrial land uses) and mobile sources (*e.g.*, motor vehicles); consequently, increases in population and urbanization tend to affect air quality. Mobile sources such as vehicle emissions are generally not regulated and are not covered under existing permitting requirements. Air quality at a given location is a function of several factors, including the quantity and type of pollutants being emitted locally and regionally, and the dispersion rates of pollutants in the region. Primary factors affecting pollutant dispersion are wind speed and direction, atmospheric stability, temperature, the presence or absence of inversions, and topographic features of the region.

The KDHE conducts annual compliance inspections with the KSARNG. In addition, Army Environmental Compliance Assessment System audits are conducted approximately every 2-3 years. Based on these two audit mechanisms, the KSARNG has implemented the required programs to maintain compliance with federal and state air regulations.

Camp Funston/Fort Riley. Camp Funston/Fort Riley is located in Clay, Geary, and Riley counties, which are covered by the North Central Kansas Intrastate Air Quality Control Region (Updyke 2003). Ambient air quality for Clay, Geary, and Riley counties is classified as better than the NAAQS for SO_2; unclassifiable/attainment for CO, O_3, PM_{10}; and cannot be classified or is better than the

NAAQS for NO_2. Pb is not designated for this region. Unclassifiable areas are those areas that have not had ambient air monitoring and are assumed to be in attainment with NAAQS.

Kansas City Armory. Kansas City Armory is located in Wyandotte County, which is covered by the North Central Kansas Intrastate Air Quality Control Region (Updyke 2003). Ambient air quality for Wyandotte County is classified as unclassifiable/attainment for SO_2, CO; PM_{10}, and NO_2. Pb is not designated for this region. Wyandotte County was designated an attainment area in 1992 after being designated a sub-marginal maintenance area for O_3.

Lawrence Armory. Lawrence Armory is located in Douglas County, which is covered by the North Central Kansas Intrastate Air Quality Control Region. Ambient air quality for Douglas County is classified as unclassifiable/attainment for SO_2, CO; PM_{10}, and NO_2. Pb is not designated for this region.

Wichita South Armory. Wichita South Armory is located in Sedgwick County, which is covered by the North Central Kansas Intrastate Air Quality Control Region. Ambient air quality for Sedgwick County is classified as unclassifiable/attainment for SO_2, CO; PM_{10}, and NO_2. Pb is not designated for this region.

4.3 Geological Resources

4.3.1 Definition of the Resource

An area's geological resources typically consist of surface and subsurface materials and their inherent properties. Principal factors influencing the ability of geological resources to support structural development are topography and soil stability. Bedrock is a principal factor influencing the seismic properties of an area.

Topography is defined as the relative positions and elevations of the natural and/or man-made features of an area that describe the configuration of its surface. An area's topography is influenced by many factors, including human activity, seismic activity of the underlying geological material, climatic conditions, and erosion. Information about an area's topography typically encompasses surface elevations, slope, and physiographic features (*i.e.*, mountains, ravines, or depressions) (KSARNG 2003).

The term soil generally refers to unconsolidated materials overlying bedrock or other parent material. Soils play a critical role in both the natural and human environment. Soil depth, structure, elasticity,

strength, shrink-swell potential, and erodibility determine a soil's ability to support man-made structures and facilities. Soils typically are described in terms of their series or association, slope, physical characteristics, and relative compatibility or constraints in regard to particular construction activities and types of land use.

4.3.2 Existing Conditions

Topography

Fort Riley. Fort Riley lies within the Osage Plains section of the Central Lowlands physiographic province. It is bordered by the Great Plains on the west and the Ozark Plateau on the east. Elevation ranges from 1,025 to 1,365 feet (312 to 416 meters) above mean sea level. Terrain slopes down in a general southeast direction at an approximate rate of 30 feet to the mile (KSARNG 2003).

Geology and Soil

Fort Riley. Fort Riley is part of the Great Plains Winter Wheat and Range Soil Resource Region. This region is covered with a foot or less of windblown material, or loess. The loess rests upon alternating layers of weathered limestone and shale. Most upland soils are friable, silty loam 6 to 12 inches thick, overlying nearly impervious clays. Fort Riley's soils developed residually from parent materials and from other materials carried by water or wind and deposited at the installation. The permeability of installation soils varies from excessively drained sandy lowland soils to tight clays with very slow permeability. Bedrock depths under these soils vary from less than one foot to more than 10 feet.

The U.S. Department of Agriculture Natural Resources Conservation Service (formerly the Soil Conservation Service) mapped 36 soil series on Fort Riley and taxonomically categorized them into six soil associations. The six soil types on Fort Riley are the Wymore-Irwin, Clime-Sogn, Benfield-Florence, Smolan-Geary, Eudora-Haynie-Sarpy and Reading-Kennebec-Ivan associations. These four upland soil associations represent more than 85 percent of the land area on Fort Riley. Table 4-2 provides description and location of these soils (KSARNG 2003).

Kansas City Armory. The Kansas City Armory is on a heavily altered landscape. The lower-lying portions were built on fill from a flood in 1951 and earlier fill from road widening placed in low lying areas, and on higher ground, the former soil surface has been obliterated by roadwork and construction.

Table 4-2. Types of soils that occur at Fort Riley

Name	Description	Location
Wymore-Irwin	Soils are deep, nearly level to sloping silty clay loams	Along a corridor on either side of old Highway 77 that crosses the installation from south to north and thus receives the bulk of the vehicular traffic associated with the training mission at Fort Riley.
Clime-Sogn	Soils are moderately deep to shallow, sloping and moderately steep silty clay loam. The lack of soil depth and slope position of these soils makes them subject to severe erosion if unprotected.	Occur prominently in the Impact Area and in Training Areas on the east, south, and west of Custer Hill.
Benfield-Florence	Soils are moderately deep, sloping and moderately steep, silty clay loams and cherty silt loams.	On the eastern side of Fort Riley.
Smolan-Geary	Soils are deep, gently sloping and sloping silt loams, on high terraces and uplands. These deep loess soils are subject to severe erosion if not protected.	All of Maneuver Area C is included in the Smolan-Geary Soil Association.
Eudora-Haynie-Sarpy	Soils are very deep, silt loams and Sarpy is a deep gravelly sandy loam.	Located on the southern boundary of the installation along the Republican and Kansas rivers.
Reading-Kennebec-Ivan	Soils are very deep, nearly level, well drained silt loams soils.	Located near the northeastern boundary of the installation along Wildcat Creek and its tributaries.

Source: KSARNG 2003

Lawrence Armory. The Lawrence Armory is on Woodson silt loam, an upland soil formed in loess.

Wichita South Armory. The Wichita South Armory is on Waldeck sandy loam, an alluvial soil formed in course textured alluvium found along stream courses on low terraces or floodplains (KSARNG 2001b).

4.4 Biological Resources

4.4.1 Definition of the Resource

Biological resources include native or naturalized plants and animals, and the habitats, such as wetlands, forests, and grasslands, in which they exist. Sensitive and protected biological resources

include plant and animal species listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS) or the State of Kansas.

Wetlands are an important natural system and habitat because of the diverse biologic and hydrologic functions they perform. These functions include water quality improvement, groundwater recharge and discharge, pollution mitigation, nutrient cycling, wildlife habitat detention, and erosion protection. Wetlands are protected as a subset of the "the waters of the United States" under Section 404 of the CWA. The term "waters of the United States" has a broad meaning under the CWA and incorporates deep-water aquatic habitats and special aquatic habitats (including wetlands). U.S. Army Corps of Engineers (USACE) defines wetlands as "those areas that are inundated or saturated with ground or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (33 CFR Part 328).

Under the ESA (16 United States Code [U.S.C.] 1536), an "endangered species" is defined as any species in danger of extinction throughout all or a significant portion of its range. A "threatened species" is defined as any species likely to become an endangered species in the foreseeable future. The USFWS also maintains a list of species considered to be candidates for possible listing under the ESA. Although candidate species receive no statutory protection under the ESA, the USFWS has attempted to advise government agencies, industry, and the public that these species are a risk and may warrant protection under the Act.

4.4.2 Existing Conditions

Due to the fact that the proposed armory locations are located in more urban settings and the biological conditions are limited and that no threatened or endangered species have been identified at these locations, the following subsections (i.e., vegetation, wildlife, and wetlands, etc.) describe the biological conditions at Fort Riley only.

Vegetation

This region consisted of tall- and mixed-grass prairies dominated by big bluestem (*Andropogon gerardi),* indiangrass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum)* under natural conditions (KSARNG 2003). The presettlement prairie was maintained through periodic wildfires and grazing by herbivores. Woodlands were present within moist bottomlands of floodplains and along perennial stream corridors. However, past and current land management practices, such as the

suppression of wildfires, the introduction of agriculture and stock grazing, and the construction and expansion of military facilities, have resulted in the establishment and expansion of several vegetation classes at Fort Riley. The four broad categories of land cover on Fort Riley are grassland, shrublands, forestlands, savannas and croplands. Table 4-3 provides a listing of the types of vegetation that occurs at Fort Riley.

As of 2002, 233 plant species from 178 genera and 59 families have been collected and preserved at Fort Riley. The number of plant species identified at Fort Riley is expected to increase as surveying and collection efforts continue.

Grasslands

Grasslands on Fort Riley comprise about 67 percent of the installation. Grasslands consist of two basic types: native prairie and "go-back" areas. Areas designated as "go-back" are lands that were once cultivated. "Go back" areas comprise 33 percent of the grasslands. Table 4-3 provides a listing of the types of vegetation that occurs at Fort Riley.

Shrublands

Shrublands are not a historic feature of the prairie environment. The reduction in wildfires and grazing practices employed before the federal Government acquired the installation, plus the abandonment of cropfields upon the area's acquisition and subsequent fire suppression efforts have contributed to the establishment of shrublands on Fort Riley. Nevertheless, shrublands remain a minor component of the installation's landscape, covering no more than 2–5 percent of the post. Shrublands are located along the edges of woodlands, in isolated patches along the smaller intermittent drainages and ravines, and sheltered areas within grasslands. Table 4-3 provides a listing of the types of vegetation that occurs at Fort Riley.

Forestlands

Forestlands comprise approximately 16,400 acres of Fort Riley. Most of this acreage is associated with the bottomland forests along the Republican and Kansas rivers and the woodlands within the drainages of Threemile, Sevenmile, and Wildcat creeks.

Twenty-eight tree species have been recorded on Fort Riley. A Forest Inventory conducted 1997–1998 showed the most common species were (in descending order) American elm (21.6 percent), hackberry (19.4 percent), and chinquapin oak (9.1 percent). Table 4-3 provides a listing of the types of vegetation that occurs at Fort Riley.

Table 4-3. Types of Vegetation on Fort Riley

Category	Common Name	Scientific Name
Grasslands		
	snow-on-the-mountain	*Agaloma marginata*
	tall witch grass	*Agropyron repens*
	western ragweed	*Ambrosia psilostachya*
	big bluestem	*Andropogon gerardii*
	little bluestem	*Andropogon scoparius*
	prairie threeawn	*Aristida oligantha*
	sideoats grama	*Bouteloua curtipendula*
	smooth brome	*Bromus inermis*
	Japanese brome	*Bromus japonicus*
	daisy fleabane	*Erigeron strigosus*
	taller fescue	*Festuca elatior*
	switchgrass	*Panicum virgatum*
	foxtail	*Setaria* spp
	green bristlegrass	*Setaria viridis*
	Missouri goldenrod	*Solidago missouriensis*
	Indiangrass	*Sorghastrum nutans*
	dropseed	*Sporolus asper*
Shrublands		
	hackberry	*Celtis occidentalis*
	rough-leaved dogwood	*Cornus drummondii*
	eastern red cedar	*Juniperus virginiana*
	American plum	*Prunus americana*
	smooth sumac	*Rhus glabra*
	Arkansas rose	*Rosa arkansana*
	buckbrush	*Symphoricarpos rbiculatus*
	American elm	*Ulmus americana*
Forestland		
	bitternut hickory	*Carya cordiformis*
	hackberry	*Celtis occidentalis*
	green ash	*Fraxinus pennsylvanica*
	honey locust	*Gleditsia triacanthos*
	black walnut	*Juglans nigra*
	sericea lespedeza	*Lespedeza cuneata*
	red mulberry	*Morus rubra*
	Virginia creeper	*Parthenocissus quinquefolia*
	sycamore	*Platanus occidentalis*
	cottonwood	*Populus deltoides*
	bur oak	*Quercus macrocarpa*
	chinquapin oak	*Quercus muehlenbergia*
	poison ivy	*Toxicodendron rydbergii*
	American elm	*Ulmus americana*
	red elm	*Ulmus rubra*

Savannas

Fort Riley's ecosystem has natural components similar to those in savannas, which are often considered ecotones between forests and grasslands. Savannas are areas that have tree canopy coverage from 5–15 percent, are one acre or more in size, have associations with typical prairie vegetation and have canopies typical of open-grown trees. Savanna vegetation composition and density are mainly determined by fire. Consequently, the pattern and extent of present savannas depend on recent fire histories and the land's geomorphology. Most sites on Fort Riley meeting the above criteria for a savanna are in Maneuver Areas A, D, J, and N. The total area of savanna sites on Fort Riley is approximately 450 acres.

A survey of Fort Riley's savannas was completed in 1999. This survey showed more than one-fourth of the plots surveyed have significant visible fire indicators on the trees. Fort Riley's savannas have an average of 25 trees per acre. Thirteen tree species were recorded during this survey. The most common species were hackberry (33 percent), American elm (22 percent) and green ash (12 percent). Sixty-two species of understory plants exist in Fort Riley's savannas. The most common are smooth bromegrass (37 percent), big bluestem (12 percent), Japanese bromegrass (5 percent), and little bluestem grass (5 percent). Notably, noxious weeds are very rare on the savanna sites (0.1 percent).

Croplands

Croplands are a minor component of the Fort Riley ecosystem but are important to wildlife. Approximately 1,600 acres located along much of the east, north, and west boundaries of Fort Riley are leased to local farmers. Approximately 500 additional acres of croplands serve as wildlife food plots throughout the installation.

Wildlife

Fort Riley habitat supports at least 43 species of mammals, 223 species of birds, 41 species of reptiles and amphibians, and 50 species of fish. Many of these species are year-round residents although most of the birds are seasonal migrants.

Game Animals and Furbearers

Fort Riley supports viable populations of all the typical game species found in this region of Kansas, as well as a small managed elk (*Cervus canadensis)* population. Game birds include northern bobwhite quail (*Colinus virginianus*), ring-necked pheasant (*Phasianus colchicus)* (the only exotic terrestrial game species on Fort Riley), greater prairie-chicken (*Tympanuchus cupido*), mourning dove

(*Zenaida macroura)*, and woodcock (*Scopolax minor*). Several species of ducks are common. Fox squirrels (*Sciurus niger*) and eastern cottontail rabbits (*Sylvilagus floridanus*) are common, eastern gray squirrels (*Sciurus carolinensis*) are uncommon, and blacktail jackrabbits (*Lepus californicus*) are rarely seen. Those species, which the state defines as "big game" on Fort Riley, are white-tailed deer (*Odocoileus virginianus*), mule deer (*Odooileus hemionus*) (rarely present), elk, and turkey (*Meleagris gallopava*). Furbearer species are badger (*Taxidea taxus*), bobcat (*Lynx rufus*), mink (*Mustela vison*), muskrat (*Ondatra zibethica*), opossum (*Didelphis marsupialis*), raccoon (*Procyon lotor*), red fox (*Vulpes fulva*), gray fox (*Urocyon cinereoargenteus*), striped skunk (*Mephitius mephitius*), coyote (*Canius latrans*), and beaver (*Castor canadensis*).

Non-Game Animal

Twenty-four species of non-game mammals have been documented to occur on Fort Riley. Numerous inventories of birds have been conducted on Fort Riley, resulting in the observation of 223 species, many of which are neotropical migrants. Forty-one species of reptiles and amphibians (18 species of snakes, 6 lizards, 7 turtles, and 10 amphibians) have been observed on Fort Riley. The most common species are the ringneck snake (*Diadophis punctutus*) and the western chorus frog (*Psuedacris triseriata*).

Numerous inventories conducted have documented 60 species of fish in Fort Riley's streams, lakes, and ponds. Thirty-six species have been found in the Kansas, Smokey Hill, and Republican rivers. Fish assemblages in ponds and lakes are largely represented by species managed for recreational fishing. Inventories of aquatic insects and mussels have been conducted in Fort Riley's perennial streams. Nineteen orders/families of aquatic insects and evidence of 17 species of mussels have been documented. Seven of these mussel species were found readily visible. The other 10 mussel species have apparently been removed from the installation.

Threatened and Endangered or Rare Species

Numerous surveys have been conducted at Fort Riley. Only four federally listed species have been observed at Fort Riley. Three are birds: the bald eagle (*Haliaeetus leucocephalus*), least tern (*Sterna antillarum*), and piping plover (*Charadrius melodus*). The bald eagle winters on Fort Riley, and the other two species are uncommon migratory transients. The fourth species is the Topeka shiner (*Notropis topeka*). The Topeka shiner, a minnow, has been found in Wildcat, Seven Mile, Wind, Honey Creek and Little Arkansas creeks, all of which are streams on the east side of the installation.

Most threatened and endangered species habitats at Fort Riley occur in stream and riverine riparian areas.

Other federally listed species that are found in the State of Kansas might occur at Fort Riley but have not been observed. Appendix B provides a listing of all federal- and state-listed species that could potentially occur at Fort Riley. Details pertaining to the management of federal and state listed species, and delisted species, peregrine falcon (*Falco peregrinus*), at Fort Riley are contained in the installation's Endangered Species Management Plan.

Listed Habitats

There is no federal threatened and endangered species critical habitat on Fort Riley. However, Kansas has designated critical habitat on the installation for five species: bald eagle, piping plover, least tern, sturgeon chub, and Topeka shiner.

- The bald eagle critical habitat has been designated as all lands and waters within five air miles of public lands around Kansas, Republican, Smokey Hill rivers, and Milford and Tuttle Creek reservoirs.
- The least tern and piping plover critical habitat has been designated as all waters within the corridor along the main stem of the Kansas River.
- The sturgeon chub critical habitat has been designated as the main stem of the Kansas River from its confluence with the Republican and the Smoky Hill rivers to its confluence with the Missouri River.
- The Topeka shiner critical habitat has been designated as the Wildcat, Little Arkansas, and Seven Mile creeks.

Wetlands

The USFWS mapped wetlands on Fort Riley in 1991 as part of its National Wetlands Inventory. Wetland areas on Fort Riley include springs and seeps, streams, rivers, ponds and lakes, low areas behind terraces in abandoned crop-fields, and emergent marshes along the periphery of waterbodies, such as those within the Madison Creek and Farnum Creek arms of Milford Lake. According to National Wetland Inventory survey maps, the wetland area identified as Three Mile Creek is located to the south of Camp Funston. No wetlands occur within the boundaries of Camp Funston.

4.5 Cultural Resources

4.5.1 Definition of the Resource

Cultural resources are defined by the NHPA as prehistoric and historic sites, structures, districts, or any other physical evidence of human activity considered important to a culture, a subculture, or a community for scientific, traditional, religious, or any other reason. Depending on the condition and historic use, such resources could provide insight into living conditions in previous civilizations or may retain cultural and religious significance to modern groups.

Several federal laws and regulations govern protection of cultural resources, including the NHPA (1966), the Archaeological and Historic Preservation Act (AHPA) of 1974, the American Indian Religious Freedom Act (AIRFA) of 1978, the Archaeological Resources Protection Act (ARPA) of 1979, the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990, and DOD Annotated Policy on American Indians and Alaska Natives dated 27 October 1999 (KSARNG 2003).

Typically, cultural resources are subdivided into archaeological resources (prehistoric or historic sites where human activity has left physical evidence of that activity but no structures remain standing) or architectural resources (buildings or other structures or groups of structures that are of historic or aesthetic significance). Archaeological resources comprise areas where human activity has measurably altered the earth or deposits of physical remains are found (*e.g.*, arrowheads and bottles). Architectural resources include standing buildings, bridges, dams and other structures of historic or aesthetic significance.

For the purpose of this project, "cultural resource" is defined according to the glossary of AR 200-4, as follows:

> Historic properties as defined by the NHPA, cultural items as defined by NAGPRA, archeological resources as defined by ARPA, sacred sites as defined in EO 13007 to which access is afforded under AIRFA, and collections and associated records as defined in 36 CFR 79 of the NHPA.

4.5.2 Existing Conditions

Fort Riley is responsible for the identification and protection of significant archaeological and architectural resources in accordance with the NHPA of 1966 (as amended) and the ARPA of 1979. Phase I archaeological surveys and architectural inventories at Fort Riley have been conducted to provide a complete inventory of historic properties. Fort Riley Army installation and KSARNG

completed separate Integrated Cultural Resources Management Plans (ICRMP) in September 2001 and January 2001, respectively. These plans identify all known historic properties and activities for their management and regulatory compliance. The ICRMP also includes Standard Operating Procedures (SOPs) for inadvertent discoveries, human remains, and burial sites, and the treatments and/or protection of known historic properties (*e.g.*, districts, buildings, objects, and archaeological sites) (KSARNG 2001a).

No archeological resources have been found at any of the proposed armories. Examination of the topography and historical context suggests that there is only minimal potential for any archeological remains to be found at any of the armories. Most of the armories occupy upland locations, areas of fill dirt and/or old dumps, or have been heavily altered by earthmoving and/or graveling, and therefore have little or no potential for finding archeological remains (KSARNG 2001b).

The Fort Riley ICRMP identifies all historic sites within the boundaries of Fort Riley. None of these historic sites would be affected by implementation of the proposed construction activities. Furthermore, no historic sites occur on or near the proposed construction areas at Camp Funston. The KSARNG ICRMP identifies all historic sites that occur on KSARNG properties. Kansas City, Lawrence or Wichita South armories have not been identified as historic sites. (KSARNG 2001c)

Fort Riley has identified traditional cultural properties (TCP) within its boundaries that are potentially eligible for listing in the NRHP and recognizes that there may be more identified in the future. None of the TCP's are located within the boundaries of the proposed action site locations.

Incorporated within the Fort Riley ICRMP are a series of SOPs that set forth standards and procedures to be followed, in consultation with the Kansas State Historic Preservation Officer (SHPO), for dealing with NAGPRA, TCP, and related cultural resource issues (see ICRMP, Volume 3). In addition, Comprehensive Agreements (CAs) between Fort Riley and both the Kaw and Pawnee Nations have been signed. These CAs specifically address NAGPRA related issues (KSARNG 2001a).

A Programmatic Agreement (PA) among the Fort Riley, the Kansas SHPO, and the Advisory Council on Historic Preservation regarding maintenance, rehabilitation, construction, and repair operations on Fort Riley clearly outlines the cultural resources management SOPs for compliance with the NHPA and its implementing regulation 36 CFR 800. The PA ties together more specific management practices and activities that Fort Riley is accomplishing under several individual management plans and agreements. These other plans and agreements include the following (KSARNG 2003):

- The ICRMP provides a programmatic basis and guidance for the management and preservation of the cultural resources at Fort Riley in accordance with the Archaeological Collections Management Recommendations.
- The Historic Landscape Inventory provides Fort Riley with a brief analysis regarding the evaluation of eleven landscapes on the Main Post and vicinity relating to the NHPA.
- The Historical and Architectural Documentation Report produced to assist in the management of historic structures present at Fort Riley.

The comprehensive agreements between Fort Riley and the Kaw and Pawnee Nations established policies, procedures, and protocols for the treatment and disposition of Native American cultural items including human remains, funerary objects, sacred objects, and objects of cultural patrimony. The agreements pertains to the inadvertent discovery and intentional excavation of Native American human remains and the cultural items over which the Kaw or Pawnee Nations may have priority of custody within the lands owned or controlled by the U.S. Army at Fort Riley.

4.6 Socioeconomics and Environmental Justice

4.6.1 Definition of the Resource

Socioeconomics are defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Factors that describe the socioeconomic environment represent a composite of several interrelated and nonrelated factors.

Indicators of economic conditions that were evaluated include economic growth, average personal income, employment/unemployment rates, percentage of residents living below the poverty level, employment by business sector, and cost of housing. Demographic data identified changes to population levels; and the race, ethnicity, poverty status, and educational attainment level of residents living around an installation. Data on the installation's expenditures in the regional economy was also used to help identify the relative importance of an installation in terms of its purchasing power and jobs base.

Title VI of the Civil Rights Act and EO 12898, F*ederal Actions to Address Environmental Justice in Minority and Low-Income Populations* ("Environmental Justice") direct federal agencies to consider whether their actions would cause a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, tribal, and local programs and policies. Consideration of environmental justice concerns includes race, ethnicity, and the poverty status of populations in the vicinity of where a

proposed action would occur. Such information aids in evaluating whether a proposed action would render vulnerable any of the groups targeted for protection in the EO.

The Environmental Justice analysis focuses on the distribution of race and poverty status in areas potentially affected by implementation of a proposed action. For the purpose of this analysis, minority and low-income populations are defined as,

- *Minority Populations*: Persons of Hispanic origin of any race, Blacks, American Indians, Eskimos, Aleuts, Asians, or Pacific Islanders.
- *Low-Income Populations*: Persons living below the poverty level as reported in the 2000 Census.

On April 21, 1997, the President issued EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. This EO directs federal agencies, to the extent permitted by law and mission, to identify and assess environmental health and safety risks that might disproportionately affect children. The EO further directs federal agencies to ensure that their policies, programs, activities, and standards address these disproportionate risks. The EO defines environmental health and safety risks as "risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest (such as the air we breathe, the food we eat, the water we drink and use for recreation, the soil we live on, and the products we use or are exposed to)."

4.6.2 Existing Conditions

The four communities that host the KSARNG facilities range from medium-sized mid-western communities to a large city. Table 4-4 lists population, employment, and other socioeconomic indicators for residents around Lawrence, Manhattan, the Kansas City Metropolitan Statistical Area (MSA), and Wichita. A substantially larger portion of residents living around Manhattan (3.1 percent) are in the Armed Services than residents of the other communities or the statewide average. Fewer residents around the four communities are employed in agriculture than the statewide average (U.S. Census Bureau 2000). Residents living around Fort Riley have a lower per capita income than the statewide average, and a higher portion living below the poverty level (U.S. Census Bureau 2000). The percent of residents who have obtained a high school diploma and a college degree is higher around Fort Riley and Lawrence than the statewide average (U.S. Census Bureau 2000).

Table 4-4. Economic and Social Indicators

	Lawrence	Manhattan	Kansas City	Wichita	State of Kansas
Population (2000)	99,962	44,831	1,780,000	525,220	2,688,418
Population change (1990–2000)	22%	18.9%	13.4%	12.4%	8.5%
Percent of Employed Persons in Armed Forces	0.2%	3.1%	0.3%	0.7%	0.7%
Industry of Civilian Labor Force					
Agriculture, forestry, fishing and hunting, and mining	1.0%	1.3%	0.7%	1.1%	3.8%
Construction	6.3%	5.2%	6.8%	6.1%	6.5%
Manufacturing	9.1%	3.2%	11.2%	24.4%	15.0%
Wholesale trade	1.8%	1.2%	4.3%	3.1%	3.3%
Retail trade	11.9%	13.6%	11.6%	11.2%	11.5%
Transportation and warehousing, and utilities	3.1%	1.7%	6.0%	4.0%	5.2%
Information	4.4%	2.6%	5.3%	2.1%	3.3%
Finance, insurance, real estate, and rental and leasing	5.8%	5.6%	8.7%	5.3%	6.1%
Professional, scientific, management, administrative, and waste management services	8.2%	7.5%	10.3%	6.8%	7.2%
Educational, health, and social services	29.3%	36.5%	18.4%	20.3%	21.9%
Arts, entertainment, recreation, accommodation, and food services	10.7%	12.0%	7.3%	7.3%	7.0%
Other services (except public administration)	4.4%	4.8%	4.7%	4.8%	4.6%
Public administration	3.9%	4.8%	4.7%	3.4%	4.4%
Employment and Income					
Unemployment Rate	4.6%	7.4%	4.3%	4.6%	4.2%
Per Capita Income	$19,952	$16,566	$23,326	$20,692	$20,506
Percent of Individuals Below Poverty Level	15.9%	24.2%	8.5%	9.1%	9.9%
Educational Attainment					
Achieved High School Diploma	92.4%	94.9%	86.7%	85.3%	86%
Achieved College Degree	42.7%	48.2%	28.5%	24.7%	25.8%

Source: U.S. Census Bureau 2000

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5. Environmental Consequences

5.1 Introduction

This section forms the scientific and analytic basis for the comparison of alternatives. It identifies the direct, indirect, and cumulative effects that would occur upon implementation of the KSARNG's Proposed Action and alternatives to convert to the proposed assigned units (presented in Sections 2.0 and 3.0 of this EA) on each of the resource areas previously described in the Affected Environment (Section 4.0). Both beneficial and adverse effects are described. If no effects are identified for a particular resource area, that fact is mentioned.

5.2 Air Quality

The potential effects to local and regional air quality conditions near a proposed federal action are determined based upon the increases in regulated pollutant emissions relative to existing conditions and ambient air quality. Specifically, the impact in NAAQS "attainment" areas would be considered significant if the net increases in pollutant emissions from the federal action resulted in one of the following scenarios:

- Cause or contribute to a violation of any national or state ambient air quality standard
- Expose sensitive receptors to substantially increased pollutant concentrations
- Represent an increase of ten percent or more in an affected AQCR emissions inventory

5.2.1 Effects of the Proposed Action

Local and regional pollutant effects resulting from direct and indirect emissions from stationary emission sources under the Proposed Action are addressed through federal and state permitting program requirements (40 CFR Parts 51 and 52 and KDHE regulations). Fort Riley has appropriate permits in place and has met all applicable permitting requirements and conditions for specific stationary devices (Fort Riley 2001).

The Proposed Action consists of constructing facilities within the State of Kansas and operating within training areas at Fort Riley.

Conformity. Since Camp Funston/Fort Riley is located within an unclassifiable/attainment area for all criteria pollutants, General Conformity Rule requirements are not applicable.

Based on a review of current mission activities and other mission operations at Camp Funston/Fort Riley, it has been determined that the potential sources of NO_x and VOC pollutant emissions associated with the Proposed Action would be from construction activities associated with the Proposed Action and mission operations, maintenance, and support activities after delivery of the M2A2s. Under the proposal, the first of the M2A2s would be delivered in 2004. The construction activities would be complete before the full battalion of M2A2s would be in operation. The scope of the analysis was limited to those operations or activities that result in emissions that would be directly or indirectly attributable to the implementation of the Proposed Action.

The potential air quality impacts have been assessed based on the characteristics of the Proposed Action (i.e., fighting vehicle mission operations, construction, etc.) and are presented below.

Construction Activities. The Proposed Action consists of the four construction projects, which include constructing an M-COFT and supporting utilities at Camp Funston/Fort Riley, Kansas City Armory, Lawrence Armory, and Wichita South Armory. These projects address the requirements for the M2A2 BFV and support facilities.

For purposes of this analysis, the project duration and affected project site area to be disturbed information presented in Section 2 was used to estimate fugitive dust and all other criteria pollutant emissions. These emissions would produce slightly elevated short-term PM_{10} ambient air concentrations. However, the effects would be temporary, and would fall off rapidly with distance from the proposed construction site.

The construction projects would generate TSP and PM_{10} emissions as fugitive dust from ground disturbing activities (e.g., grading, demolition, soil piles, etc.) in addition to the emissions of all criteria pollutants from the combustion of fuels in construction equipment. Fugitive dust emissions would be greatest during the initial site preparation activities and would vary from day-to-day depending on the construction phase, level of activity, and prevailing weather conditions. The quantity of uncontrolled fugitive dust emissions from a construction site is proportional to the area of land being worked and the level of construction activity.

Fugitive dust emissions for various construction activities were calculated using emission factors and assumptions published in USEPA's Compilation of Air Pollutant Emission Factors (AP-42) Section 11.9 dated July 1998 and Section 13.2 dated September 1998.

Construction operations would also result in emissions of criteria pollutants as combustion products from construction equipment. These emissions would be of a temporary nature. The emission factors and estimates were generated based on guidance provided in USEPA's AP-42.

Specific information describing the types of construction equipment required for a specific task, the hours the equipment is operated, and the operating conditions vary widely from project to project. For purposes of analysis, these parameters were estimated using established methodologies for construction and experience with similar types of construction projects. Combustion by-product emissions from construction equipment exhausts were estimated using USEPA's AP-42 emissions factors for heavy-duty diesel-powered construction equipment.

The construction emissions include the estimated annual emissions from construction equipment exhaust associated with the Proposed Action. As with fugitive dust emissions, combustion emissions would produce slightly elevated air pollutant concentrations. Early phases of construction projects involve more heavy diesel equipment and earthmoving, resulting in higher NO_x and PM_{10} emissions. Later phases of construction projects involve more light gasoline equipment and surface coating, resulting in more CO and VOC emissions. However, the effects would be temporary, fall off rapidly with distance from the proposed construction site, and would not result in any long-term impacts.

BFV Mission Operations. The M113 has a 275 horsepower (hp) diesel engine and the proposed M2A2 BFV has a 600 hp turbo-diesel engine. Table 5.1 provides criteria pollutant emissions factors for the M113 and the M2A2 BFV. No emission factors were available for the M113 fighting vehicle. Therefore, emission factors for the M113 were approximated by scaling the hp of the M113 to the hp of the M2A2 (i.e., 275/600 = 45.8%).

The amount of dust generated by the M2A2 is difficult to quantify and would primarily be a function of rainfall, road and trail maintenance, the types of soils present, the extent of vegetation cover in off-road maneuver areas, and vehicle speed. Because the M2A2 is a heavier vehicle that produces slightly greater ground pressure than the M113, there would be the potential for greater soil and ground disturbance and dust production. Increases in fugitive dust production are expected to be negligible and short term since the training with these vehicles is limited to annual training and inactive duty training. Although Fort Riley does not receive a substantial amount of rainfall to assist in the reduction of dust produced by training activities, Fort Riley does institute a Best Management Practice of applying water to tracked vehicle trails.

Table 5-1. Engine Emissions Factors for the M113 and M2A2

Criteria Pollutant	275 hp Engine (Post 1994, Run 1)	275 hp Engine (Post 1994, Run 2)	275 hp Engine (Post 1994, Average)	600 hp Engine (Post 1994, Run 1)	600 hp Engine (Post 1994, Run 2)	600 hp Engine (Post 1994, Average)
NO_x	1,731.95	1,606.00	1,668.98	3,778.80	3,504.00	A3,641.40
VOC	247.78	253.83	250.80	540.60	553.80	547.20
CO	393.80	420.75	407.28	859.20	918.00	888.60
SO_2	NA	NA	NA	NA	NA	NA
PM_{10}	NA	NA	NA	NA	NA	NA

Source: ARNG 2002

Notes: M2A2 air emissions data were provided by the engine manufacturer for the M2A2, and are based on testing the 600 hp engine over multiple testing runs.

g/hr grams/hour
hp horsepower
NO_x oxides of nitrogen
VOC volatile organic compounds
CO carbon monoxide
SO_2 sulfur dioxide
PM_{10} particulate matter equal to or less than ten microns in diameter
NA not available

While all proposed locations are within an attainment area for all criteria pollutants, mobile sources such as vehicle emissions are generally not regulated and are not covered under existing permitting requirements by the KDHE. Fort Riley complies with federal and state air regulations. Construction operations would also result in emissions of criteria pollutants as combustion products from construction equipment. Construction emissions would be temporary and produce slightly elevated air pollutant concentrations, short-term PM_{10} ambient air concentrations. Construction emissions related to this project would be spread over a one year period, and the proposed M2A2 BFV exercises would be consistent with exercise currently conducted at Fort Riley. However, the effects would be temporary and would fall off rapidly with distance from the proposed construction sites. Therefore, there would be no adverse effects to air quality from the Proposed Action.

Analysis. Table 5-2 summarizes the current and proposed air quality emissions from construction and fighting vehicle mission operational activities. For purposes of this analysis, it was assumed that annual training exercises generally take place 14 days during each of the three summer months, and inactive duty training takes place one weekend per month (three days assumed). Based on this information it was assumed that fighting vehicle mission operations would be conducted 78 days per year for an average of 12 hours per day (totaling 936 hours per year per vehicle). It was also assumed that current mission training activities would only include M113 operations and that the Proposed

Action would include training operations with remaining M113's and the Proposed Action M2A2. Detailed emission calculations can be found in Appendix C.

Table 5-2. No Action and Proposed Action Air Quality Emission Estimates

	Current and Proposed Action Emissions Estimates				
Calendar Year	**NO_x (tpy)**	**(VOC tpy)**	**CO (tpy)**	**SO_2 (tpy) [1]**	**PM_{10} (tpy) [1]**
North Central Kansas Intrastate AQCR 1993 Target Year Emission Budget	31,567	26,628	144,092	4,059	118,610
No Action (Baseline)	96.44	14.49	23.53	0.00	0.00
Proposed Action (Per Year)	193.54	29.29	47.47	0.02	0.21
Increase/Decrease in Emissions (Proposed Action -No Action)	+97.10	+14.80	+23.93	+0.02	+0.21
Proposed Action Percent of Target Year Emission Budget	0.6131%	0.1100%	0.0329%	0.0004%	0.0002%

Note: [1] No emission factors for criteria pollutants SO_2 and PM_{10} were available for the M113 or M2A2 BFV. Therefore, they were not included in the above emission estimates..

Source: USEPA 2004

tpy tons per year

As shown in Table 5-2, the Proposed Action, combined with existing operations and projected mission activities would cumulatively not exceed 10 percent of the regional inventory. Therefore, no significant impact on regional or local air quality would be expected to result from implementation of the Proposed Action. Appendix C details the emission factors, calculations, and estimates of construction- and mission-related emissions for the Proposed Action. Because the emissions generated would be a small fraction of regional emissions, it is reasonable to assume that the temporary construction and long-term mission operational emissions caused by the Proposed Action would not cause a violation of the NAAQS.

5.2.2 Effects of the No Action Alternative

The No Action alternative would not result in any changes to the baseline air quality conditions in and around any of the proposed training sites. Emissions of NO_x, CO, and hydrocarbon would not be reduced by the No Action alternative.

5.3 Geological Resources

5.3.1 Effects of the Proposed Action

The M113 and M2A2 BFVs are heavy tracked vehicles. Tracked vehicle training activities affect soil resources and increase the potential for soil erosion by disturbing vegetation and disturbing and compacting soils. Impacts to soils from training with the M2A2 BFV would have the potential to increase compared to the M113, because the M2A2 BFV is heavier (66,000 vs. 27,200 pounds). However, the effects on soils would be minor. This is due to the fact that the ground pressure produced by the M2A2 BFVs is only 1.18 psi greater than the M113 (9.85 vs. 8.67 psi) and has the same track width (21 inches). The frequency, duration, types, and locations of training conducted with the M2A2 BFVs would not change significantly from current M113 training.

At Fort Riley, maneuver training with the M2A2 BFV would be conducted on designated tank trails and in established maneuver areas. The Army recognizes the need to maintain these areas to ensure their sustainable use for training and to protect the environment. The installation has implemented the Army's Integrated Training Area Management (ITAM) Program. The ITAM Program would mitigate the impacts caused by training at Fort Riley. The ITAM Program establishes procedures to achieve optimum sustainable use of training and testing lands by implementing a uniform land management program that includes the following:

- Inventorying and monitoring land conditions
- Integrating training and testing requirements with training land carrying capacity
- Educating land users to minimize adverse impacts
- Providing for training land rehabilitation and maintenance

Continued implementation of the ITAM program at Fort Riley would help identify any increases in soil erosion that might result from the proposed fielding of the M2A2 BFV. Therefore, the proposed fielding of the M2A2 BFV would continue to result in minor adverse effects on soils during training (KSARNG 2003).

The armories have been extensively altered over time and the project area is permanently disturbed with existing facilities and paved roads. Therefore, there would be no adverse effects on the geological resources resulting from implementation of the Proposed Action at these armories (KSARNG 2003).

5.3.2 Effects of the No Action Alternative

The No Action Alternative would not result in any changes to the baseline conditions for geology and soils in and around any of the proposed training sites.

5.4 Biological Resources

5.4.1 Effects of the Proposed Action

Training with the M2A2 BFV would be conducted in areas that are currently used for M113 training. Therefore, the potential for additional effects on biological resources would be minor. As discussed earlier, the M2A2 BFV is heavier and has a slightly higher ground pressure than the M113, but has the same track width. Therefore, minor adverse effects on vegetation due to disturbance would continue to occur during maneuver training. Continued implementation of the ITAM Program at Fort Riley would identify impacts to vegetation and the need for land rehabilitation. Therefore, effects on vegetation from M2A2 BFV maneuvering would not be considered significant at the training areas.

It is possible that maneuver training in the BFV might inadvertently affect wetlands throughout the range training areas. However, no additional disturbance to wetlands would occur under the Proposed Action compared to baseline conditions. The ITAM Program at Fort Riley would continue to evaluate wetland impacts and land rehabilitation needs.

The Proposed Action would not be expected to affect federal- or state-listed threatened or endangered species because training would continue to occur in the same areas. Threatened and endangered species surveys have been conducted and management procedures, identified in the INRMP, are in place to ensure that federally and state listed species are not impacted by training activities.

Training with the proposed equipment would occur on tank trails and in areas currently used for fielding and training with tracked vehicles. Effects on endangered species are not expected to change. Therefore, only minor adverse effects on biological resources would be expected to occur.

Armories are urbanized, and may have been extensively altered over time. The project areas are permanently disturbed with existing facilities and paved roads. In addition, previous surveys indicated that there are no known threatened and endangered species or locally rare wildlife species or habitats on the armories. Therefore there would be no adverse effects on the biological resources resulting from implementation of the Proposed Action at these armories.

5.4.2 Effects of the No Action Alternative

The No Action Alternative would not result in any changes to the baseline conditions for biological resources in and around any of the proposed training sites.

5.5 Cultural Resources

5.5.1 Effects of the Proposed Action

The Proposed Action includes limited ground disturbance for placement of the M-COFT. Additional ground disturbing activities would be limited to maneuver and gunnery training with the M2A2 BFV, in areas that are currently disturbed by similar M113 training. Therefore, prehistoric, historic, and architectural resources would not be additionally affected by the Proposed Action. Fort Riley has an ongoing cultural resources management program that includes development of their ICRMP, archaeological surveys, and Section 106 consultation. The SOP regarding inadvertent discovery, as described in the respective in Fort Riley ICRMP, would be followed during training.

In accordance with the NHPA (16 U.S.C. 470a *et seq.*), 36 CFR Part 800, and AR 200-4, this federal undertaking would have no effect on historic properties. The SHPO for Kansas was contacted, per Section 106 of the NHPA and NEPA, and concurred with this conclusion (KSARNG 2003).

Also, in consideration of the DOD Annotated Policy on American Indians and Alaska Natives (dated 27 October 1999), EO 13175, and AR 200-4, the KSARNG has concluded that the nature of the action would not have any impacts on Native American tribes or communities, based on the fact that BFVs are already in use at Fort Riley, the impact of the BFV is not significantly different from the M113, and there are no Native American reservations adjacent to Fort Riley. Therefore there is no need to initiate formal government-to-government consultations at this time.

5.5.2 Effects of the No Action Alternative

The No Action Alternative would not result in any changes to the baseline conditions for cultural resources in and around any of the proposed training sites.

5.6 Socioeconomics and Environmental Justice

This section identifies potential economic and social impacts that might result from a proposed action. Economic effects from the Proposed Action are associated with proposed construction activities; no change in operations is anticipated.

The methodology for the economic impact assessment is based on the Economic Impact Forecast System (EIFS) developed by the DOD in the 1970s to identify and address the regional economic effects of proposed military actions efficiently (EIFS 2004). EIFS provides a standardized system to quantify the impact of military actions and to compare various options or alternatives in a standard, nonarbitrary approach. The EIFS assesses potential effects on four principal indicators of regional economic impact: business volume, employment, personal income, and population. As a "first tier" approximation of effects and their significance, these four indicators have proven very effective. The methodology for social effects is based on *The Guidelines and Principles for Social Impact Assessment*, developed by an interorganizational committee of experts in their field (NOAA 1994). Finally, this section also evaluates environmental justice concerns to include disproportionate effects on low-income or minority populations.

The Proposed Action would have a significant impact with respect to the socioeconomic conditions in the surrounding Region of Influence (ROI) if it would

- Change the local business volume, employment, personal income, or population that exceeds the ROI's historical annual change
- Adversely affect social services or social conditions, including property values, school enrollment, county or municipal expenditures, or crime rates
- Disproportionately impact minority populations or low income populations

5.6.1 Effects of the Proposed Action

The Proposed Action would involve minimal change in operations, including no overall change in military or civilian personnel. Therefore, there would be no effect on the local workforce. Construction, planning, and design costs associated with the Proposed Action are estimated to be $35,000 each in Lawrence and Wichita, and $40,000 at Fort Riley. No construction is proposed for the Kansas City location. These projects would generate a small amount of temporary employment for construction workers drawn primarily from the local workforce, resulting in a minimal short-term, beneficial direct effect on the local economy. Census data for the Lawrence and Wichita MSAs, and Manhattan city found 3,498, 16,205, and 1,242 employees (respectively) working in the construction industry in 2000. The number of construction workers required for the proposed construction projects is relatively small compared to the available work force in the area, and should be adequate without impacting local employment.

Indirect effects from the Proposed Action would generate an average of $24,000 each in Lawrence, Wichita, and Manhattan from the purchase of construction materials and related supplies and services

from local businesses. Indirect effects are expected to be short-term and beneficial to local employment and the local economy. The Proposed Action would not directly or indirectly create any permanent new jobs in the communities (EIFS 2004). The Proposed Action should have no permanent or long-term effects on population, personal income, or poverty levels, or other demographic or employment indicators in the communities around the Proposed Action.

Changes in economic factors can also impact the social fabric of a community. For example, increases in employment could stimulate the need for new housing units, and, as a result, increased demand for community and social services such as primary and secondary education, fire and police protection, and health care. The Proposed Action should not stimulate changes in population size or distribution around the four communities and would have a negligible impact on employment and the local economy. Demand for new housing units and other social services would not be affected. Construction or development projects can also affect social conditions if it involves a change in land use or development of previously undeveloped or "open" spaces. The Proposed Action does not involve changes in land use or new development; therefore, no effects on social conditions are anticipated.

5.6.2 Effects of the No Action Alternative

The No Action Alternative would not result in any changes to the baseline conditions at Fort Riley or at the armories.

5.7 Mitigation Measures

Mitigation generally includes avoiding an effect altogether by stopping or modifying the action, minimizing an effect by limiting the degree or magnitude of an action and the activities associated with its implementation, and rectifying an effect by repairing, rehabilitating, or restoring the affected environment. Mitigation may also involve reducing or eliminating an effect over time by preservation and maintenance operations during the life of an action or compensating for an effect by replacing or providing substitute resources or environments.

The ARNG and the Army have established policies and procedures in place to ensure that environmental conservation measures and military activities on training lands are integrated and consistent with federal stewardship requirements. Mitigation of adverse impacts associated with the fielding of the M2A2 BFV would occur through continued implementation of a variety of programs and plans, including: ITAM Program, INRMPs, ICRMPs, Hazardous Waste Management Plans, and

Integrated Contingency Plans. These plans and programs are routinely updated to account for changing conditions.

As discussed in Sections 5.3, and 5.4, fielding of the M2A2 BFV at Fort Riley might have the potential to affect geological and biological resources due to the somewhat increased weight compared to the M113. Tracked vehicle training-related impacts are currently addressed at these installations through implementation of the Army's ITAM Program. Continued implementation of the ITAM program at Fort Riley would avoid significant impacts to geological and biological resources by proactively identifying and repairing training-related damage.

No specific mitigation measures will be necessary to reduce environmental impacts from the KSARNG's proposed action to below significant levels.

5.8 Cumulative Effects

Cumulative effects are those that have the potential to arise when a proposed action, combined with one of several similar past, present, or future actions, by the KSARNG or others, could have similar impacts in the same geographic area.

It is anticipated that there would be numerous future proposals that could have an effect on, or be affected by, the fielding of the M2A2 BFV. Examples of the types of proposals or events that might bear on the proposed fielding include other Reserve or Active Component forces fielding similar equipment, modifications or improvements to training ranges, physical enlargements of the training ranges, introduction of other weapons systems that could compete for range availability, development of simulator training, alteration of tactical doctrine, and force structure modification (*e.g.*, to enlarge or reduce KSARNG requirements for personnel and equipment). The timing, location, or magnitude of these types of potential actions cannot be accurately predicted. The carrying capacity of training area resources to accommodate additional uses would normally limit cumulative effects. In addition, ongoing Army initiatives within the ITAM, Conservation, Compliance, and Pollution Prevention Programs help to define carrying capacity and avoid cumulative effects.

Review of recent, ongoing, and known future activities at the four locations proposed to receive the M2A2 BFV reveals the presence of no actions that, in conjunction with the proposed fielding, would result in any adverse cumulative effects.

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6. Comparison of Alternatives and Conclusions

6.1 Comparison of the Environmental Consequences of the Alternatives

Table 6-1 summarizes and compares the anticipated environmental effects of the Proposed Action and the No Action Alternative. The Proposed Action would have minor adverse effects on the following resources areas: air quality, geological resources, and biological resources. The Proposed Action would have no effect on cultural resources and socioeconomics and environmental justice. As discussed in Section 3, other alternatives to the Proposed Action were not considered feasible and did not meet KSARNG screening criteria and were not subject to detailed analysis in this EA. Potential environmental effects of the Proposed Action are summarized by resource area in the table below:

Table 6-1. Comparison of Alternatives

Resource Area	Proposed Action	No Action Alternative
Air Quality (See section 5.2)	Minor adverse effects	No changes
Geological Resources (See section 5.3)	Minor adverse effects	No changes
Biological Resources (See section 5.4)	Minor adverse effects	No changes
Cultural Resources (See section 5.4)	No effects	No changes
Socioeconomics and Environmental Justice (See section 5.5)	No effects	No changes

The proposed fielding and operation of the M2A2 BFV would occur at existing training sites where their predecessors, the M113, are currently operated. The locations, frequency, duration, magnitude, and types of training and maintenance would not change under the Proposed Action. Consequently, potential environmental effects of the Proposed Action are largely associated with differences between the new and old equipment.

The No Action Alternative would not result in changes to baseline conditions for any of the resource areas.

6.2 Conclusions

Based on the analysis presented in Section 5 of this EA, implementing the proposed action would have no significant adverse impact on the environment or socioeconomics. This EA supports a FNSI. Accordingly, fielding and operation of the M2A2 BFV at the four locations described would not require preparation of an EIS.

7. References

ARNG 2002 — Army National Guard (ARNG). 2002. *Environmental Assessment of the* Fielding *and Operation of the M2A2 Bradley Fighting Vehicle, the M2A2 Bradley Fighting Vehicle – Operation Desert Storm, and the M1A1 Abrams Main Battle Tank (Heavy Armor) by the Army National Guard at Pelham Range, Alabama and Fort Bragg, North Carolina.* August 2002.

DOA 2002 — Mechanized Infantry Platoon and Squad (Bradley). 2002. Field Manual No. 3-21.71. Headquarters, Department of the Army Washington, DC. August 2002

EIFS 2004 — Economic Impact Forecast System (EIFS). 2001. U.S. Army Environmental Policy Institute and the Computer Information Sciences Department of Clark Atlanta University. EIFS model accessed on March 4, 2004.

Fort Riley 2001 — Fort Riley. 2001. *Fort Riley Annual Emissions Inventory for 2001*. December 2001.

Global Security 2004 — Global Security. 2004. Information regarding M113 – Armored Personnel Carrier. Available online <*http://www*.globalsecurity.org/military/systems/grounds/m113.htm>. Accessed 28 January 2004.

KSARNG 2001a — Kansas Army National Guard (KSARNG). 2001. *Kansas Army National Guard Cultural Resource Management Plan*. Prepared by Randall M. Thies, Archeology Office, Cultural Resources Division, Kansas State Historical Society. 01 January 2001.

KSARNG 2001b — Kansas Army National Guard (KSARNG). 2001. *Fort Riley U.S. Army Installation and 24TH Infantry Division (Mechanized) Integrated Natural Resource Management Plan 2001-2005*, Fort Riley, Kansas. June 2001.

KSARNG 2001c — Kansas Army National Guard (KSARNG). 2001. *Fort Riley U.S. Army Installation and 24TH Infantry Division (Mechanized) Integrated Cultural Resource Management Plan 2001-2006*, Fort Riley, Kansas. September 2001.

KSARNG 2003 — Kansas Army National Guard (KSARNG). 2003. *Environmental Assessment of the Combined Arms Military Operations in Urban Terrain Task Force Suite at Fort Riley Army Installation, Kansas.* May 2003.

NOAA 1994 — National Oceanic and Atmospheric Administration (NOAA). 1994. The Interorganizational Committee on Guidelines and Principles for Social Impact Assessment. "Guidelines and Principles for Social Impact Assessment," U.S. Department of commerce, Technical Memorandum NMFS-F/SPO-16.

SAMAS 2003 — SAMAS, Kansas Army National Guard. 2003. Kansas Army National Guard Personnel information for Topeka and Junction armories.

U.S. Census Bureau 2000	U.S. Department of Commerce, U.S. Census Bureau. 2000. Census 2000 Summary File 1, Summary File 2, and Summary File 3 for the State of Kansas, Manhattan City, Kansas City MSA, Lawrence MSA and Wichita MSA.
Updyke 2003	Updyke, Bob. 2003. Personal correspondence between Mr. Bob Updyke, Air Quality Manager (AFZN-ES-C) and Mr. McCain regarding existing air quality conditions at Fort Riley. April 3, 2003.
USEPA 2004	U.S. Environmental Protection Agency (USEPA). 2004. AirData NET Tier Report <*http://www.epa.gov/air/data/nettier.html*>. Site visited on March 18, 2004.

8. List of Preparers

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M.S. Environmental Sciences and Engineering
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B.S. Environmental Science
Years of Experience: 2

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9. Agencies and Individuals Consulted

Mr. Chris Hase
Aquatic Ecologist, Environmental Services Section
Kansas Department of Wildlife and Parks
512 SE 25th Ave
Pratt, KS 67124

Ms. Donna Fisher
Kansas Department of Health and Environment
Division of Environment, Director's Office
Curtis State Office Building
1000 SW Jackson Street, Suite 400
Topeka, Kansas 66612-1367

Mr. William Gill
Field Supervisor, Ecological Services
U.S. Fish and Wildlife Service
315 Houston Street, Suite E
Manhattan, KS 66502

Mr. Terry Marmet
State Historic Preservation Officer
Kansas State Historical Society
6425 SW 6th Avenue
Topeka, KS 66615-1099

Mr. David Jones
U.S. Dept. of Army
Directorate of Environment and Safety
ATTN: AFZN-ES-C (D. Jones)
Bldg 407 Pershing
Fort Riley, Kansas 66442-6016

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APPENDIX A

AGENCY AND PUBLIC PARTICIPATION

March 3, 2004

Name
Title
Agency
Street Address
City, State Zip code

Re: **Request for Information and Notification of the Preparation of an Environmental Assessment of the Fielding of M2A2 Bradley Fighting Vehicles at Fort Riley, Kansas, and Kansas Army National Guard Armories**

Dear Name:

engineering-environmental Management, Inc. (e^2M) is currently under contract with the Fort Riley Army Installation to assist in the preparation of an Environmental Assessment (EA) concerning the proposed fielding of the M2A2 Operation Desert Storm Bradley Fighting Vehicles (BFVs) at Fort Riley, Kansas and Kansas Army National Guard (KSARNG) Armories. We are informing you of this study effort, and requesting:

- Any information your agency may have on file that might be pertinent to our analysis.
- Areas of interest that you feel should be considered in the EA process.
- Additional points of contact that we should consider contacting.

The KSARNG proposes to replace its M113 Armored Personnel Carriers with M2A2 BFVs at four locations in the State of Kansas: Fort Riley and the Kansas City, Lawrence, and Wichita South Armories. Fort Riley would receive 39 BFVs, and the armories would each receive two BFVs.

Training exercises would involve an increase in number of troops, pieces of equipment, and frequency and duration of training. Construction of a new simulator would be necessary at Fort Riley/Camp Funston and the Lawrence and Wichita South Armories. The simulator would provide training in target acquisition, and identification and engagement with weapon systems of assigned equipment. The Proposed Action would also include an increase of personnel as support teams for the BFVs at the Topeka and Junction City Armories. The study area for environmental concerns includes areas that would be used for construction and training, and socioeconomic effects of increased personnel. A detailed Description of Proposed Actions and Alternatives is included as an attachment.

The purpose of this EA is to identify and evaluate environmental impacts (including physical and biological, historical and archaeological, and socioeconomic) associated with the fielding of the M2A2 BFVs at the proposed locations. As part of the EA, we will identify and describe the proposed action, alternatives to these actions, and related environmental effects as required by the President's Council on Environmental Quality, the National Environmental Policy Act of 1969, and Army Regulations.

The EA will review the potential impacts of the Proposed Action and a No Action Alternative. The alternatives identified to date are listed below. Based on initial screening criteria, no additional potential implementation alternatives have been identified.

1. Preferred Alternative (Field the M2A2 BFVs). This alternative is the proposed action and the preferred alternative and would include the all tasks listed in the project description described above.
2. No Action Alternative. Under this alternative, the BFVs would not be fielded at Fort Riley or the KSARNG Armories. This alternative would result in continuing the existing operations conducted at Fort Riley and the armories and define the environmental baseline upon which the preferred alternative may be compared.

A list of the other persons and organizations that are being contacted as part of this initial coordination effort is included in Appendix A of the attachment to this letter.

Should you have any questions or need any further information, please contact Major Anthony Randall, Ph.D. (AGKS-DOFE-E) at (785) 274-1151 or Steven A. Mechels (AGKS-DOFE-E) at (785) 274-1152. Thank you.

Sincerely,
engineering-environmental Management, Inc.

Gus Hare
Business Area Manager, Noise

Attachment: Description of Proposed Action and Alternatives

K A N S A S

RODERICK L. BREMBY, SECRETARY

KATHLEEN SEBELIUS, GOVERNOR

DEPARTMENT OF HEALTH AND ENVIRONMENT

March 2004

Please update your records regarding Kansas Department of Health & Environment.

RE: **Name and address changes**

Mr. Ronald Hammerschmidt, Ph.D.
Kansas Department of Health & Environment
Director, Division Of Environment
Curtis State Office Building
1000 SW Jackson Street, Suite 400
Topeka, KS 66612-1367
Telephone Number: 785-296-1535 Fax Number: 785-296-8464

Please send **all** Environmental Audits and Agency Review Transmittal Forms to:

Ms. Donna Fisher
Kansas Department of Health & Environment
Division Of Environment, Director's Office
Curtis State Office Building
1000 SW Jackson Street, Suite 400
Topeka, KS 66612-1367
Telephone Number: 785-291-3092 Fax Number : 785-296-8464

Please allow **two weeks** for all Environmental Audits and **30 days** for all Agency Reviews.

Sincerely,

Donna Fisher
Receptionist

AGENCY REVIEW TRANSMITTAL FORM

Comments by _____ _____
Transmittal Date

This form provides notification and the opportunity for your agency to review and comments on this proposed project as required by Executive Order 12372. Review Agency, please complete Parts II and III as appropriate and return to contact person listed below. Your prompt response will be appreciated.

RETURN TO: Mr. Gus Hare, Business Area Manager, Noise
engineering-environmental Management, Inc.
510 East Ramsey, Suit 5
San Antonio, TX 78216

___PART I **REVIEW AGENCIES/COMMISSION**

____ Aging	____ Education	____ State Forester
____ Agriculture-DWR	____ Geological Survey, KS	____ Transportation
____ Biological Survey,KS	_X_ Health & Environment	____ Water Office,KS
____ Conservation Commission	____ Historical Society	____ Wildlife & Parks
____ Corporation Commission	____ Social & Rehabilitation	_____
____ Commerce	_____	_____

PART II **AGENCY REVIEW COMMENTS**

COMMENTS: **(Attach additional sheet if necessary)** **Re:** EA of the Fielding of M2A2 Bradley Fighting Vehicles at Camp Fuston/Fort Riley, Kansas
Mr. Rob Weber, Bureau of Remediation will have comments when the draft Final is issued. He has made contact with you by phone regarding this project.

PART III **RECOMMENDED ACTION COMMENTS**

____ Clearance of the project should be granted.

___Clearance of the project should not be granted.

____Clearance of the project should be delayed until the issues or questions above have been clarified.

____ Request a State Process Recommendation in concurrence with the above comments.

__X__Clearance of the project should not be delayed but the Applicant should (in the final application) address and clarify the question or concerns indicated above.

____ Request the opportunity to review final application prior to submission to the federal funding agency.

DIVISIONS/ AGENCY/ COMMISSION

Reviewer's Name: Ronald Hammerschmidt Date: March 26, 2004
Organization: Kansas Department of Health & Environment
Ronald Hammerschmidt, Ph.D.
Director, Division of Environment
Curtis State Office Building
1000 SW Jackson St., Suite 400
Topeka, KS 66612-1367

KANSAS

DEPARTMENT OF WILDLIFE & PARKS KATHLEEN SEBELIUS, GOVERNOR

March 8, 2004

Mr. Gus Hare
Engineering-Environmental Management, Inc
510 East Ramsey Suite 5
San Antonio TX 78216

Ref: D9.0100

Dear Mr. Hare:

RE: Fielding of M2A2 Bradley Fighting Vehicles - Camp Funston-Fort Riley, Kansas and Kansas City, Wichita and Lawrence Army National Guard Armories - Riley, Sedgwick, Douglas, and Wyandotte Counties, Kansas.

The referenced project was reviewed for potential impacts on crucial wildlife habitats, current state-listed threatened and endangered species and species in need of conservation, and public recreation areas for which this agency has some administrative authority.

Our review indicates none of the named resources will be impacted. No special mitigation measures are necessary. No Department of Wildlife and Parks permits or special authorizations are needed. Although the state's species listings and the Department's lands obligations periodically change, due to the project's location and design, no future clearances will be required regardless of when the project work starts.

Sincerely,

Chris Hase

Chris Hase, Acting Chief
Environmental Services Section

Pratt Operations Office
512 SE 25th Ave., Pratt, KS 67124-8174
Phone 620-672-5911 Fax 620-672-6020 www.kdwp.state.ks.us

KANSAS

KSR&C No. 04-03-199

Kansas State Historical Society
Dick Pankratz, *Director, Cultural Resources Division*

KATHLEEN SEBELIUS, GOVERNOR

March 31, 2004

Gus Hare
e²M
510 East Ramsey, Suite 5
San Antonio, TX 78216

RE: EA for the Fielding of M2A2 Bradley Fighting Vehicles at KSARNG Facilities
Statewide Projects File

Dear Mr. Hare:

The Kansas State Historic Preservation Office has reviewed the materials you provided regarding the development of an Environmental Assessment for the Fielding of M2A2 Bradley Fighting Vehicles at Camp Funston/Fort Riley, and the Kansas City, Lawrence, and Wichita Army National Guard armories. It is our finding that the replacement of the existing M113 Armored Personnel Carriers (APCs) with M2A2 Bradley Fighting Vehicles (BFVs) does not constitute an undertaking regulated by 36 CFR 800, the implementing regulations of the National Historic Preservation Act. However, training activities and the construction of Mobile Conduct of Fire Trainer (M-COFT) facilities associated with this replacement do constitute undertakings subject to 36 CFR 800.

A review of the three proposed M-COFT locations indicates that none of the existing armories are presently eligible for listing on the National Register of Historic Places, therefore, we have no concerns for the proposed construction of the M-COFT facilities.

Provided that training activities with the potential to affect historic properties are reviewed under the Tactical Excavation Permitting system at Fort Riley, the utilization of M2A2 BFVs in place of the existing M113 APCs should have no additional effects to historic properties.

This information is provided at your request to assist you in identifying potential effects to historic properties as a result of the proposed undertaking. If you have questions or need additional information regarding these comments, please contact Jennifer Epperson at 785-272-8681 (ex. 225). Please refer to the Kansas Review & Compliance number (KSR&C#) above on all future correspondence relating to this project.

Sincerely,

Terry W. Marmet
Interim Executive Director and
State Historic Preservation Officer

Richard Pankratz, Director
Cultural Resources Division

RDP/jee

cc: Herb Abel, Fort Riley, DES

6425 SW Sixth Avenue • Topeka, KS 66615-1099
Phone 785-272-8681 Ext. 217 • Fax 785-272-8682 • Email dpankratz@kshs.org • TTY 785-272-8683
www.kshs.org

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kansas Field Office
315 Houston Street, Suite E
Manhattan, Kansas 66502-6172

April 2, 2004

Mr.Gus Hare
Engineering -environmental Management, Inc.
510 East Ramsey, Suite 5
San Antonio, Texas 78216

Dear Mr. Hare:

Thank you for your March 3, 2004 letter requesting information and providing notification of the Preparation of a Programatic Environmental Assessment for the Fielding of M2A2 Bradley Fighting Vehicles at Camp Funston/ Fort Riley, Kansas. The following information is provided for your consideration.

As you are probably aware Fort Riley, Kansas has an approved Integrated Natural Resource Management Plan for the installation. The plan includes an Endangered Species Management Plan including a series of species-specific management plans prepared by the Service and cooperatively modified by the Service and the Army.

We recommend you contact the Natural Resources office on Fort Riley (785/239-6211) to request copies of this pertinent information. The management plans in particular contain information regarding habitat protection measures which should prove useful in your assessment. I also recommend you coordinate with the Regulatory Branch of the Kansas City District of the Corps of Engineers for input regarding jurisdictional wetlands to be included in the assessment.

Of the planned measures to be implemented we would be concerned by any "*landscape modifications*" that may be employed. If this is to entail impacts to or within the riparian forest of the Kansas River corridor or stream corridors on post, then an assessment should be made of the potential for impacts to the bald eagle (*Haliaeetus leucocephalus)* and the Topeka shiner (*Notropus tapeka*). If the project may affect habitat for these species, the Army should initiate formal section 7 consultation with this office. If there will be no effect, or if the Fish and Wildlife Service concurs in writing there will be beneficial effects, further consultation is not necessary.

Another habitat type of particular concern to the Service is tallgrass prairie habitat on Fort Riley. Tallgrass prairie supports a host of fish and wildlife species, including federal species of concern such as the Henslow's sparrow (*Ammodramus henslowii*). Species of concern have no federal legal status at this time; however, further declines in their populations could increase the need for legal protection in the near future. We do not envision the need for "*landscape modifications*" within this habitat type but physical facilities are discouraged.

Thank you for the opportunity to comment on this project. If we can be of any assistance please call Mr. Dewey Caster, of my staff, at 785 539-3474 ext. 108.

Sincerely,

For: William H. Gill
Field Supervisor

WHG\drc

APPENDIX B

FEDERAL OR STATE-LISTED THREATENED OR ENDANGERED SPECIES

Appendix B

Federal- and State-listed Species and Other Rare Species That Could Occur on Fort Riley

The following table provides a detailed listing of any federal- or state-listed threatened or endangered species, as well as any species in need of conservation (SINC), species of concern (SOC), or Candidate species. SOC and SINC are species considered rare but have no legal protection. USFWS designates SOC while KDWP designates SINC. Candidate species do not receive legal protection but might receive federal protection in the future.

Species	Federal	State	Presence on Fort Riley
MAMMALS			
Eastern chipmunk, *Tamia striata*	N	SINC	Know or likely to occur in Riley County
Eastern spotted skunk, *Spilogale putorius*	N	T	Possible- may occur in suitable habitat
Franklin's ground squirrel, *Spermophilus franklinii*	N	SINC	Know or likely to occur in Riley County
Gray Bat, *Myotis grisescens*	E	E	Possible
Gray Wolf, *Canis lupus*	T	T	Possible
Indiana Bat, *Myotis sodalis*	E	E	Possible
Southern bog lemming, *Synaptomys cooperi*	N	SINC	Resident
BIRDS			
Baird's sparrow, *Ammodramus bairdii*	SOC	N	Possible
Bald eagle, *Haliaeetus leucocephalus*	T	T	Winter resident – possible nesting
Black-Capped Vireo, *Vireo atricapilla*	E	E	Possible
Black rail, *Laterallus jamaicensis*	SOC	SINC	Migrant
Black tern, *Chlidonias niger*	SOC	SINC	Migrant
Bobolink, *Dolichonyx oryzivorus*	N	SINC	Migrant
Eskimo curlew, *Numenius borealis*	E	E	Possible
Ferruginous hawk, *Buteo regalis*	SOC		Migrant - possible winter resident
Golden eagle, *Aquila chrysaetos*	N	SINC	Know or likely to occur in Riley County
Henslow's sparrow, *Ammodramus henslowii*	SOC	SINC	Know or likely to occur in Riley County
Least tern, *Sterna antillarum*	E	E	Migrant – possible nesting
Loggerhead shrike, *Lanius ludovicianus*	SOC	N	Resident
Long-billed curlew, *Numeris americanus*	N	SINC	Know or likely to occur in Riley County
Northern goshawk, *Accipiter gentiles*	SOC	N	Transient
Peregrine falcon, *Falco peregrinus*	N	E	Migrant
Piping plover, *Charadrius melodus*	T	T	Migrant – possible nesting
Red-shouldered hawk, *Buteo lineatus*	N	SINC	Transient
Short-eared owl, *Asio flammeus*	N	SINC	Possible
Snowy plover, *Charadrius alexandrinus*	N	T	Migrant
Western burrowing owl, *Athene cunicularia*	SOC	N	Migrant

Species	Federal	State	Presence on Fort Riley
Whip-poor-will, *Caprimulgus vociferous*	N	SINC	Summer resident
White-faced ibis, *Plegadis chihi*	SOC	T	Migrant – possible nesting
Whooping crane, *Grus americana*	E	E	Possible
Yellow-throated warbler, *Dendroica dominica*	N	SINC	Know or likely to occur on Riley County
REPTILES			
Eastern hognose snake, *Heterodon platirhinos*	SOC	SINC	Know or likely to occur in Riley County
False map turtle, *Graptemys pseudogeographica*	SOC	N	Resident
Texas horned lizard, *Phrynosoma cornutum*	SOC	N	Resident
Timber rattlesnake, *Crotalus horridus*	N	SINC	Possible
Western hognose snake, *Heterodon nasicus*	N	SINC	Resident
FISH			
Arkansas River Shiner, *Notropis girardi*	N	T	Possible
Blue sucker, *Cycleptus elogatus*	SOC		Resident
Highfin carpsucker, *Carpiodesvelifer velifer*	N	SINC	Know or likely to occur in Riley County
Neosho Madtom, *Noturus placidus*	N	T	Possible
Paddlefish, *Polyodon spathula*	SOC	N	Possible
Pallid Sturgeon, *Scaphirhynchus albus*	N	E	Possible
Plains minnow, *Hybognathus placitus*	N	SINC	Confirmed
Sturgeon chub, *Macrhybopsis gelida*	C	T	Know or likely to occur in Riley County
Topeka shiner, *Notropis topeka*	E	T	Know or likely to occur on Riley County
INSECTS			
American burying beetle, *Nicrophorus americanus*	E	E	Know to occur historically in Riley County
Prairie mole cricket, *Gryllotalpa major*	N		Resident
Regal fritillary butterfly, *Spereyia idalia*	SOC		Resident
PLANTS			
Mead's Milkweed, Asclepias meadii	T	T	Possible
Western prairie fringed orchid, *Platanthera praeclara*	T	T	Possible

Sources:

Hase, Chris. 2003. Written correspondence from Chris Hase, Kansas Department of Wildlife and Parks to Mr. Gus Hare, engineering-environmental Management (e^2M), regarding threatened and endangered species and species in need of conservation and critical habitat in Riley County, Kansas. 29 April 2003.

U.S. Fish and Wildlife Service (USFWS). 2004. Listings by State and Territory as of 03/04/2004 for Kansas. Available online *<http://ecos.fws.tess_public/TESSWebpageUsaLists?usMap=1&status=listed&state=KS>*. Accessed March 2004.

APPENDIX C

Emissions Estimates for EA of Fielding of M2A2 Bradley Fighting Vehicles for KSARNG

Appendix C - Clean Air Act General Conformity Analysis Emission Calculations

Emissions Estimates for EA of Fielding of M2A2 Bradley Fighting Vehicles for KSARNG

This workbook contains

Summary	(this worksheet) Summarizes total emissions by calendar year.
Combustion	(one sheet for each calendar year) Estimates emissions from non-road equipment exhaust as well as painting.
Grading	(one sheet for each calendar year) Estimates the number of days of site preparation, to be used for estimating heavy equipment exhaust and earthmoving dust emissions)
Fugitive	(one sheet for each calendar year) Estimates fine particulate emissions from earthmoving, vehicle traffic, and windblown dust.
N. Central Kansas Tier Report	Estimates net air pollution sources (area and point) in tons per year (1999) for the North Central Kansas Intrastate AQCR
Fighting Vehicle Emissions	Estimates emissions from M113 and M2A2 fighting vehicle mission operations for each calendar year.

Summary of Proposed Action's Emissions

No Action

Fighting Vehicle Model	Total Ops	NOx (tons)	VOC (tons)	CO (tons)	SO2 (tons)	PM10 (tons)
M113	52,416	96.44	14.49	23.53	NA	NA
M2A2	0	0.00	0.00	0.00	NA	NA
Total for Current		**96.44**	**14.49**	**23.53**	**0.00**	**0.00**

		NOx (ton)	VOC (ton)	CO (ton)	SO2 (ton)	PM10 (ton)
Proposed Action	Construction Eqpt.	0.35	0.26	0.32	0.02	0.03
	Fugitive Dust					0.18
	M113 Mission Operations	24.11	3.62	5.88	NA	NA
	M2A2 Mission Operations	169.08	25.41	41.26	NA	NA
	TOTAL Proposed Action	193.54	29.29	47.47	0.02	0.21

Net Emissions Changes for Proposed Action

Deltas for Proposed Action	NOx (tons)	VOC (tons)	CO (tons)	SO2 (tons)	PM10 (tons)
Proposed Action-No Action	97.10	14.80	23.93	0.02	0.21

Regional Significance (Using General Conformity Rule Significance Threshold - 10% of regional budget)

Although the General Conformity Rule is not applicable to the Proposed Action, the Conformity Significance Threshold is used as a frame of reference for this analysis. Because future year budgets were not readily available, actual 1999 air emissions inventories for the counties were used as an approximation of the regional inventory. Because the Proposed Action is two orders of magnitude below significance, the conclusion would be the same, regardless of whether future year budget data were used.

North Central Kansas Intrastate AQCR

	Point and Area Sources Combined				
Year	NOx (tpy)	VOC (tpy)	CO (tpy)	SO2 (tpy)	PM10 (tpy)
1999	31,567	26,628	144,092	4,059	118,610

Source: USEPA-AirData NET Tier Report (http://www.epa.gov/air/data/nettier.html). Site visited on 3/18/04

Determination Significance (Significance Threshold = 10%)

	NOx (tpy)	VOC (tpy)	CO (tpy)	SO2 (tpy)	PM10 (tpy)
AQCR Inventory -1999	31,567	26,628	144,092	4,059	118,610
Proposed Action Emissions	193.54	29.29	47.47	0.02	0.21
Proposed Action %	**0.6131%**	**0.1100%**	**0.0329%**	**0.0004%**	**0.0002%**

Emission Estimates for Fielding M2A2 Bradley Fighting Vehicles at KSARNG

Construction Combustion Emissions

Includes:

100% of Construct Mobile Conduct of Fire Trainer (M-COFT) Electical Distribution Facility	5,400	ft2
100% of Construct telephone and electric utilities to M-COFT facility	1,146	ft2

Assume that the M-COFT facility is 30 ft by 60 ft (1,800 sf)
Assume that three M-COFT facilities will be constructed for the Proposed Action
Assume that there would be 382 linear feet of utilities required with an average disturbance of 3 feet wide

Construction Site Air Emissions
Combustion Emissions of ROG, NOx, SO2, CO and PM10 Due to Construction

User Inputs:

Total Building Area:	6,546	ft^2	(Construct M-COFT)
Total Paved Area:	0	ft^2	(None)
Total Disturbed Area:	0.15	acres	(Construct M-COFT and utilities)
Construction Duration:	1.0	years	(assumed)
Annual Construction Activity:	60	days/yr	(assumed)

Results:[Average per Year Over the Construction Period]

	VOC	NOx	SO2	CO	PM10
Emissions, lbs/day	8.78	11.68	0.57	10.73	0.88
Emissions, tons/yr	0.26	0.35	0.02	0.32	0.03

Calculation of Unmitigated Emissions

Summary of Input Parameters

	VOC	NOx	SO2	CO	PM10
Total new acres disturbed:	0.15	0.15	0.15	0.15	0.15
Total new acres paved:	0.00	0.00	0.00	0.00	0.00
Total new building space, ft^2:	6,546	6,546	6,546	6,546	6,546
Total years:	1.00	1.00	1.00	1.00	1.00
Area graded, acres in 1 yr:	0.15	0.15	0.15	0.15	0.15
Area paved, acres in 1 yr:	0.00	0.00	0.00	0.00	0.00
Building space, ft^2 in 1 yr:	6,546	6,546	6,546	6,546	6,546

Annual Emissions by Source (lbs/day)

	VOC	NOx	SO2	CO	PM10
Grading Equipment	0.0	0.2	0.0	0.1	0.0
Asphalt Paving	0.0	0.0	0.0	0.0	0.0
Stationary Equipment	1.1	0.9	0.1	0.2	0.1
Mobile Equipment	1.0	10.5	0.5	10.5	0.8
Architectural Coatings (Non-Res)	6.6	0.0	0.0	0.0	0.0
Total Emissions (lbs/day):	**8.8**	**11.7**	**0.6**	**10.7**	**0.9**

Emission Factors
Reference: Air Quality Thresholds of Significance, SMAQMD, 1994.

	SMAQMD Emission Factor				
Source	VOC	NOx	SO2 *	CO *	PM10
Grading Equipment	2.50E-01 lbs/acre/day	1.60E+00 lbs/acre/day	0.11 lbs/acre/day	0.35 lbs/acre/day	2.80E-01 lbs/acre/day
Asphalt Paving	2.62E-01 lbs/acre/day	NA	NA	NA	NA
Stationary Equipment	1.68E-04 lbs/day/ft^2	1.37E-04 lbs/day/ft^2	9.11E-06 lbs/day/ft^2	2.97E-05 lbs/day/ft^2	8.00E-06 lbs/day/ft^2
Mobile Equipment	1.60E-04 lbs/day/ft^2	1.61E-03 lbs/day/ft^2	7.48E-05 lbs/day/ft^2	0.0016 lbs/day/ft^2	1.20E-04 lbs/day/ft^2
Architectural Coatings (Non-Res)	8.15E-02 lbs/day/ft	NA	NA	NA	NA

* Factors for grading equipment and stationary equipment are calculated from AP-42 for diesel engines using ratios with the NOx factors.
Factors for mobile equipment are calculated from ratios with Mobile5a 2001 NOx emission factors for heavy duty trucks for each site.

Emission Estimates for Fielding M2A2 Bradley Fighting Vehicles at KSARNG

Construction Fugitive Dust Emissions

Calculation of PM10 Emissions Due to Site Preparation (Uncontrolled).

User Input Parameters / Assumptions

Acres graded per year:	0.15	acres/yr	(From "Combustion" worksheet)
Grading days/yr:	0.49	days/yr	(From "Grading" worksheet)
Exposed days/yr:	90	assumed days/yr graded area is exposed	
Grading Hours/day:	8	hr/day	
Soil piles area fraction:	0.10	(assumed fraction of site area covered by soil piles)	
Soil percent silt, s:	8.5	%	(mean silt content; expected range: 0.5 to 23, AP-42 Table 13.2.2-1)
Soil percent moisture, M:	50	%	(NOAA 2003 http://www.cpc.noaa.gov/products/soilmst/drought_compc
Annual rainfall days, p:	90	days/yr rainfall exceeds 0.01 inch/day (AP-42 Fig 13.2.2-1)	
Wind speed > 12 mph %, I:	23	%	Ave. of wind speed atTopeka, KS (ftp://ftp.wcc.nrcs.usda.gov/downloads
Fraction of TSP, J:	0.5	(SCAQMD recommendation)	
Mean vehicle speed, S:	5	mi/hr	(On-site)
Dozer path width:	8	ft	
Qty construction vehicles:	0.02	vehicles	(From "Grading" worksheet)
On-site VMT/vehicle/day:	5	mi/veh/day	(Excluding bulldozer VMT during grading)
PM10 Adjustment Factor k	2.6	lb/VMT	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor a	0.8	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor b	0.4	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
PM10 Adjustment Factor c	0.3	(dimensionless)	(AP-42 Table 13.2.2-2 9/98 for PM10)
Mean Vehicle Weight W	40	tons	assumed for aggregate trucks

Emissions Due to Soil Disturbance Activities

Operation Parameters (Calculated from User Inputs)

Grading duration per acre	26.2	hr/acre	
Bulldozer mileage per acre	1	VMT/acre	(Miles traveled by bulldozer during grading)
Construction VMT per day	0	VMT/day	
Construction VMT per acre	0.3	VMT/acre	(Travel on unpaved surfaces within site)

Equations Used (Corrected for PM10)

Operation	Empirical Equation	Units	AP-42 Section (5th Edition)
Bulldozing	$0.75(s^{1.5})/(M^{1.4})$	lbs/hr	Table 11.9-18.24, Overburden
Grading	$(0.60)(0.051)s^{2.0}$	lbs/VMT	Table 11.9-18.24
Vehicle Traffic	$[k(s/12)^{a} (W/3)^{b}/(M/0.2)^{c}] [(365-P)/365]$	lbs/VMT	Section 13.2.2

Source: Compilation of Air Pollutant Emission Factors, Vol. I, USEPA AP-42, Section 11.9 dated 7/98 and Section 13.2 dated 9/98

Calculation of PM10 Emission Factors for Each Operation

Operation	Emission Factor (mass/ unit)	Operation Parameter	Emission Factor (lbs/ acre)
Bulldozing	0.08 lbs/hr	26.2 hr/acre	2.1 lbs/acre
Grading	0.77 lbs/VMT	1 VMT/acre	0.8 lbs/acre
Vehicle Traffic	0.80 lbs/VMT	0.3 VMT/acre	0.2 lbs/acre

Emissions Due to Wind Erosion of Soil Piles and Exposed Graded Surface

Reference: Air Quality Thresholds of Significance, SCAQMD, 1994.

Soil Piles EF = 1.7(s/1.5)[(365 - H)/235](I/15)(J) = (s)(365 - H)(I)(J)/(3110.2941), p. A9-99.

Soil Piles EF = 8.5 lbs/day/acre covered by soil piles

Consider soil piles area fraction so that EF applies to graded area

Soil piles area fraction: 0.10 (Fraction of site area covered by soil piles)
Soil Piles EF = 0.85 lbs/day/acres graded

Graded Surface EF = 26.4 lbs/day/acre (recommended in CEQA Manual, p. A9-93).

Calculation of Annual PM10 Emissions

Source	Emission Factor	Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing	2.1 lbs/acre	0.15	NA	0	0.00
Grading	0.8 lbs/acre	0.15	NA	0	0.00
Vehicle Traffic	0.2 lbs/acre	0.15	NA	0	0.00
Erosion of Soil Piles	0.9 lbs/acre/day	0.15	90	11	0.01
Erosion of Graded Surface	26.4 lbs/acre/day	0.15	90	357	0.18
TOTAL				369	0.18

Soil Disturbance EF: 3.1 lbs/acre
Wind Erosion EF: 27.25 lbs/acre/day

Back calculate to get EF: 4981.6 lbs/acre/grading day

Emission Estimates for Fielding M2A2 Bradley Fighting Vehicles at KSARNG

Construction (Grading) Schedule

Estimate of time required to grade a specified area.

Input Parameters
Construction area: 0.15 acres/yr (from "Combustion" Worksheet)
Qty Equipment: 0.02 (calculated based on acres disturbed)

Assumptions.
Terrain is mostly flat.
An average of 6" soil is excavated from one half of the site and backfilled to the other half of the site; no soil is hauled off-site or borrowed.
200 hp bulldozers are used for site clearing.
300 hp bulldozers are used for stripping, excavation, and backfill.
Vibratory drum rollers are used for compacting.
Stripping, Excavation, Backfill and Compaction require an average of two passes each.
Excavation and Backfill are assumed to involve only half of the site.

Calculation of days required for one piece of equipment to grade the specified area.

Reference: Means Heavy Construction Cost Data, 6th Ed., R. S. Means, 1992.

Means Line No.	Operation	Description	Output	Units	Acres per equip-day)	equip-days per acre	Acres/yr	Equip-days per year
021 108 0550	Site Clearing	Dozer & rake, medium brush	0.6	acre/day	0.6	1.67	0.15	0.25
021 144 0300	Stripping	Topsoil & stockpiling, adverse soil	1,650	cu. yd/day	2.05	0.49	0.15	0.07
022 242 5220	Excavation	Bulk, open site, common earth, 150' hau	800	cu. yd/day	0.99	1.01	0.08	0.08
022 208 5220	Backfill	Structural, common earth, 150' haul	1,950	cu. yd/day	2.42	0.41	0.08	0.03
022 226 5020	Compaction	Vibrating roller, 6 " lifts, 3 passes	1,950	cu. yd/day	2.42	0.41	0.15	0.06
TOTAL								0.49

Calculation of days required for the indicated pieces of equipment to grade the designated acreage.

(Equip)(day)/yr: 0.49
Qty Equipment: 0.02
Grading days/yr: 0.49

Round to	0 grading days/yr

Fighting Vehicle Mission Operation Emissions

Assumptions Used in Emissions Estimates

No emission factors were available for the M113 fighting vehicle. Therefore, gram/hr emission factors for the M113 were approximated by scaling the horsepower of the M113 to the horsepower of the M2A2 (i.e., 275/600 = 45.8%).

Annual training exercises generally take place 14-days during each of the three summer months, and inactive duty training takes place one weekend per month (three days assumed). Based on this information it was assumed that fighting vehicle mission operations would be conducted 78 days per year for an average of 12 hours per day (totalling 936 hours per year per vehicle).

It is assummed that for each M2A2 fielded at Camp Funston/Fort Riley, one M113 will depart.

Mission Descriptions and Mission Activity Data

M113

total mission operations hours per year.	
56	assigned M113 currently
14	assigned M113 in 2005
1.43	fuel consumption (mpg)
275 hp turbo-diesel	engine power

	No Action	Proposed Action
Mission Op Hours/Yr	52,416	13,104

M2A2

total mission operations hours per year.	
0	assigned M2A2 currently
45	assigned M2A2 in 2005
3.16	fuel consumption (mpg)
600 hp turbo-diesel	engine power

	No Action	Proposed Action
Mission Op Hours/Yr	0	42,120

Emission Factors at Maximum Power and Speed (grams/hour)

M113

Criteria Pollutant	600 hp Engine (Past 1994, Run 1)	600 hp Engine (Past 1994, Run 2)	600 hp Engine (Past 1994, Average)
NOx	1,731.95	1,606.00	1,668.98
VOC	247.78	253.83	250.80
CO	393.80	420.75	407.28
SO2	NA	NA	NA
PM10	NA	NA	NA

M2A2

Criteria Pollutant	600 hp Engine (Past 1994, Run 1)	600 hp Engine (Past 1994, Run 2)	600 hp Engine (Past 1994, Average)
NOx	3,778.80	3,504.00	3,641.40
VOC	540.60	553.80	547.20
CO	859.20	918.00	888.60
SO2	NA	NA	NA
PM10	NA	NA	NA

References: ARNG 2002

Calculations

lbs =[(EF g/hr)/(453.59 g/lb)]*(total mission operatonal hours per year)

Current M113 Mission Operation Emissions Estimates (Baseline)

M113 No Action Emissions Estimates

	NOx	VOC	CO	SO2	PM10
Total (lbs)	192,876.34	28,983.89	47,067.04	NA	NA
Total (tpy)	96.44	14.49	23.53	NA	NA

M2A2 No Action Emissions Estimates

	NOx	VOC	CO	SO2	PM10
Total (lbs)	0.00	0.00	0.00	NA	NA
Total (tpy)	0.00	0.00	0.00	NA	NA

Grand Total No Action Emissions Estimates

	NOx	VOC	CO	SO2	PM10
Total (tpy)	96.44	14.49	23.53	NA	NA

Proposed Actic M2A2 Mission Operation Emissions Estimates (Proposed)

M113 Proposed Action Emissions Estimates

	NOx	VOC	CO	SO2	PM10
Total (lbs)	48,219.09	7,245.97	11,766.76	NA	NA
Total (tpy)	24.11	3.62	5.88	NA	NA

M2A2 Proposed Action Emissions Estimates

	NOx	VOC	CO	SO2	PM10
Total (lbs)	338,159.82	50,815.91	82,520.13	NA	NA
Total (tpy)	169.08	25.41	41.26	NA	NA

Grand Total Proposed Action Emissions Estimates

	NOx	VOC	CO	SO2	PM10
Total (tpy)	193.19	29.03	47.14	NA	NA

Net Change: 2005-Current tpy	**96.75**	**14.54**	**23.61**	**NA**	**NA**

North Central Kansas Intrastate AQCR

Emission Estimates for Fielding M2A2 Bradley Fighting Vehicles at KSARNG

			Area Source Emissions					Point Source Emissions				
Row #	State	County	CO	NOx	PM10	SO2	VOC	CO	NOx	PM10	SO2	VOC
SORT												
14	KS	Clay Co	4,570	740	5,287	60	910	90	301	30	< 1	18
15	KS	Cloud Co	4,400	1,018	7,347	102	797	99	436	17	< 1	287
21	KS	Dickinson Co	14,531	2,572	8,928	161	2,104	97	832	57	2	156
27	KS	Ellsworth Co	7,577	1,343	6,726	75	900	769	1,765	242	23	94
31	KS	Geary Co	13,900	2,154	5,162	132	2,176	14	25	75	27	73
45	KS	Jewell Co	3,870	706	7,463	59	583	0	0	0	0	0
53	KS	Lincoln Co	3,296	630	5,401	48	445	3	13	5	1	1
59	KS	McPherson Co	16,181	2,862	14,031	234	3,307	1,657	1,878	706	2,361	2,478
62	KS	Mitchell Co	3,248	745	7,730	65	753	12	30	1	10	50
64	KS	Morris Co	6,768	913	4,614	61	974	0	0	0	0	0
72	KS	Ottawa Co	3,821	709	6,280	56	533	12	60	2	1	2
79	KS	Republic Co	3,098	723	6,318	63	588	7	54	1	< 1	2
80	KS	Rice Co	4,669	915	7,635	78	779	413	2,906	82	2	281
81	KS	Riley Co	22,389	2,555	9,021	153	3,404	42	133	66	1	90
85	KS	Saline Co	23,108	3,139	8,667	189	3,644	2	9	22	< 1	404
101	KS	Washington Co	5,418	1,270	6,680	94	789	31	131	14	1	6
Grand Total			140,844	22,994	117,290	1,630	22,686	3,248	8,573	1,320	2,429	3,942

North Central Kansas Intrastate AQCR

NOx (tpy)	VOC (tpy)	CO (tpy)	SO2 (tpy)	PM10 (tpy)
31,567	26,628	144,092	4,059	118,610

SOURCE:
http://www.epa.gov/air/data/nettier.html
USEPA - AirData NET Tier Report
*Net Air pollution sources (area and point) in tons per year (1999)
Site visited on March 18, 2004